JULY, 1957

Commercial Fertilizer

and PLANT FOOD INDUSTRY

SUPERPHOSPHATE IS THE KEY TO FERTILIZER PROGRESS!

SEE PAGE 19

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Take a good look at your multiwall bag!



Like women's bathing suits, multiwall bags also reveal the passing of time.

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the new sales builder in your fertilizer



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because it provides for *controlled release* of plant nutrients for health, steady growth and good color.

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★ **Valuable to your employees**
because it's less dusty—also no hazard in handling.

★ **Valuable to you**
for all these reasons plus giving you a new sales stimulant in a time of tough competition.

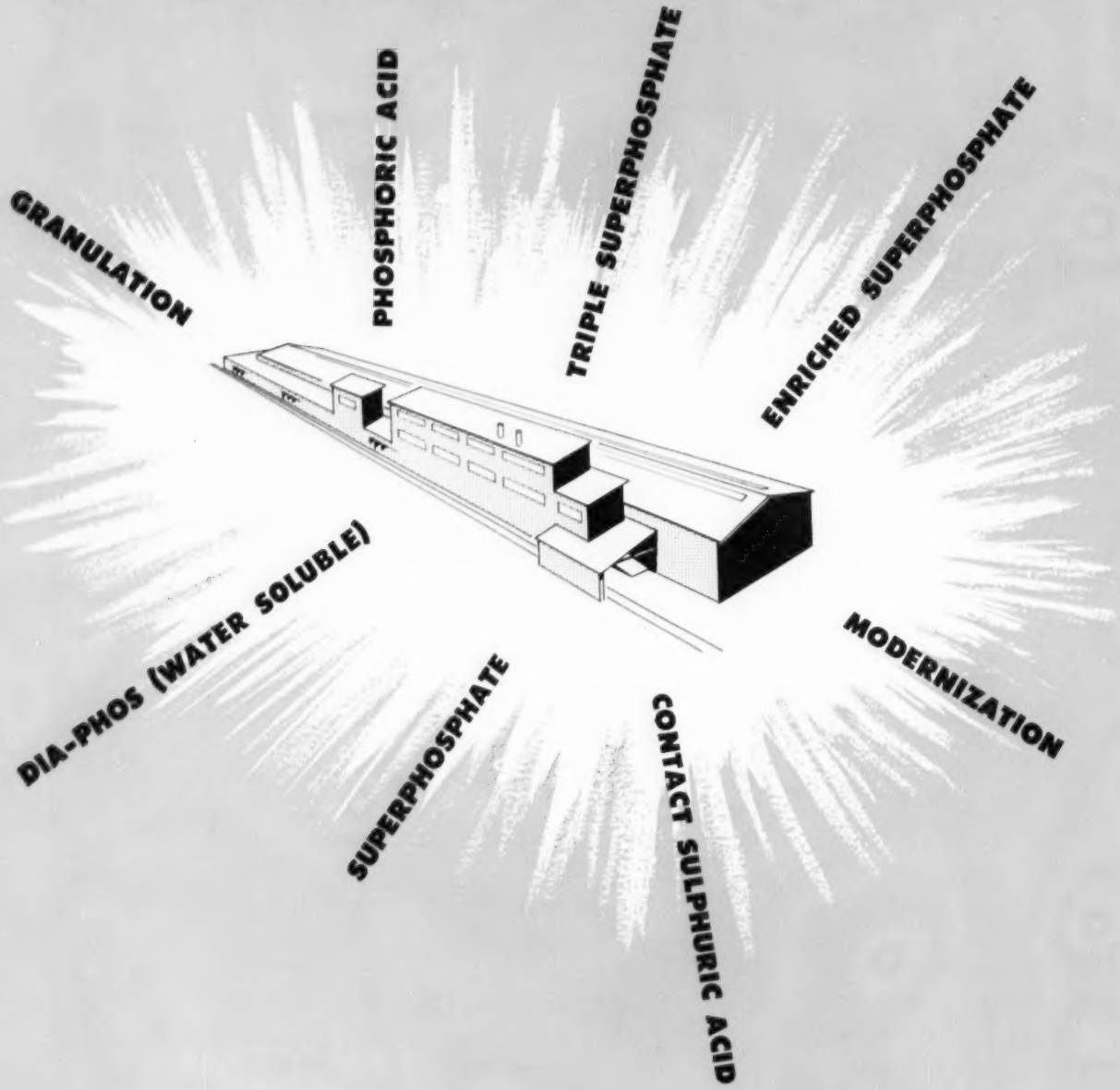
Let us figure the cost of NUTRONITE delivered to your plant.

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Bag straight Nutronite to fill out your line of lawn and garden fertilizers. Golf courses use large quantities, too. Colorful Nutronite bags available, plus merchandising aids. For information, write Smith-Rowland Co., Norfolk, Va.

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Commenting Freely

by Bruce Moran

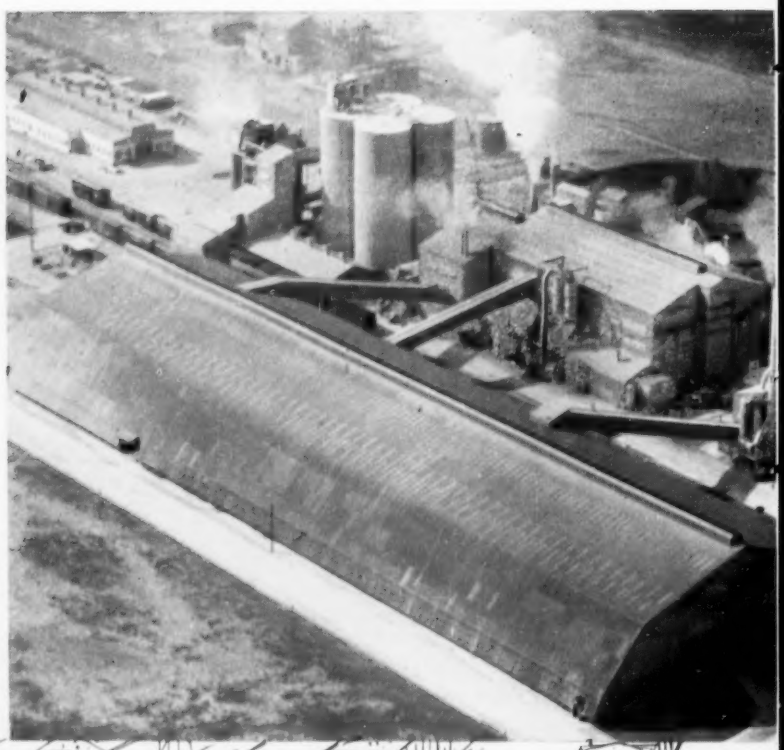
The plans of farmers to do something about their plight is at least new. Each commodity is to have its own vertical "union" . . . wheat, cotton, tobacco, livestock and so on down the line even to minor commodities. Then an overall horizontal banding together, so that the farmers will be represented as a unified force. And that force will be applied to Congress in the coming very-sensitive year.

A farm lobby built like that, and able to make up its mind what it wants in general and what each commodity group wants specifically can get things done. What they will do to the economy is another question . . . but the whole farm picture needs clarification, and maybe this is the way to do it.

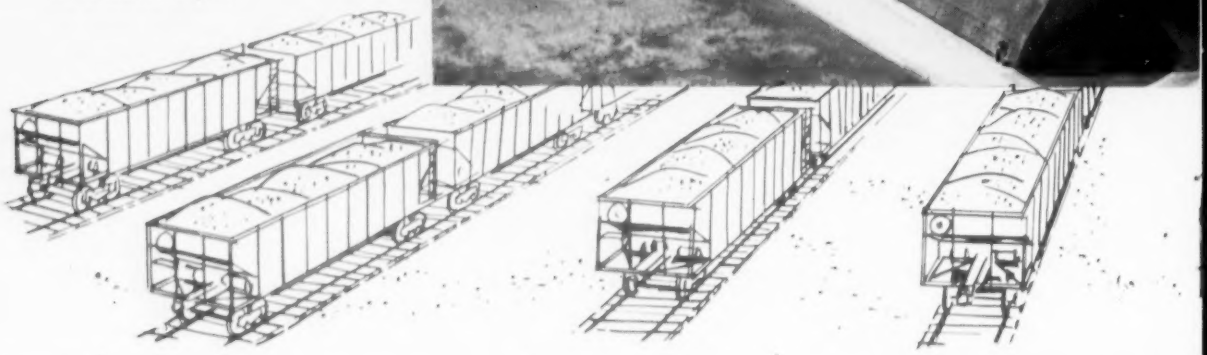
We'll all be watching with interest, I am sure . . . as fertilizer people on the one hand, and as consumers on the other!

There's a good reason why . . .

Last year's customers

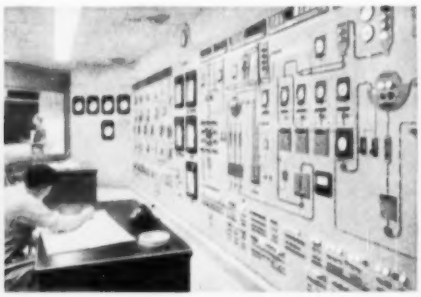


This 85,000-ton curing unit — as big as two full-sized football fields — is one example of the time and big capacity needed to produce natural-cured triple.





Round-the-clock production takes the push out of peak season demands. Mammoth off-season storage capacity plus the industry's finest delivery schedules assure you high-quality triple when you need it.



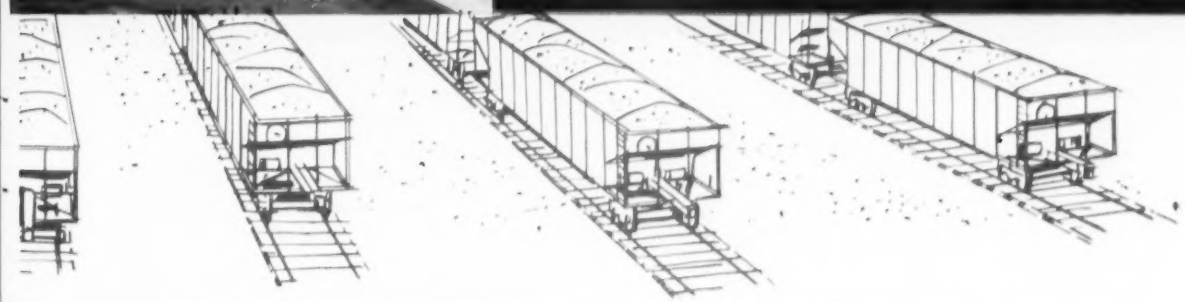
These "doodads" and dials get results . . . guard the uniformity and quality of every batch of triple super from Bonnie . . . help assure you of top ammoniation results every time.

MINERALS International CHEMICALS

are this year's contracts



They tried . . . were satisfied . . . and signed



In just one year, over ¼ million tons of triple super sales have switched to Bonnie. That's how we know there's a new sense of satisfaction among triple super users this year.

In typical cases, manufacturers ordered spot shipments . . . tried our triple . . . and were satisfied. And before long, the word got around — "International's new triple is *really* good." In fact, even nitrogen producers began recommending our triple to their customers with ammoniation problems. The reasons?

Reliability — one high-quality source. *Quality* — unbeatable control with product uniformity that makes formulation easier. *Fast service* — mammoth inventory at conveniently-located warehouses. *Priced right* — to help you meet competition. *Friendly cooperation* — from International's transportation department. *Technical assistance* — that helps cut formulation costs.

If you have not already signed, we invite you to consider International.

INTERNATIONAL MINERALS & CHEMICAL CORPORATION

PHOSPHATE CHEMICALS DIVISION . . . . 20 N. WACKER DRIVE, CHICAGO 6, ILL.

JUST AROUND THE CORNER *by Vernon Mount*

THE DUPONT CASE is a danger signal to all industry that is integrating in an effort to broaden the base on which it sits. The politician fails to recognize that this is sound economics for the worker, the stockholder, the consumer – and sees only that the bigs get bigger.

TEDDY ROOSEVELT conducted a "pogrom" of this kind, and hurt a lot of industries in the process. It tends to keep investors out of the market. It increases the cost of management and of general overhead. It slows the whole progress of the national economy.

EDUCATE your personnel and stockholders to the facts. They vote. Only votes can stop this dangerous development.

Yours faithfully,

Vernon Mount

WELDED ALUMINUM TANKS

In all sizes and types for Nitrate Solutions

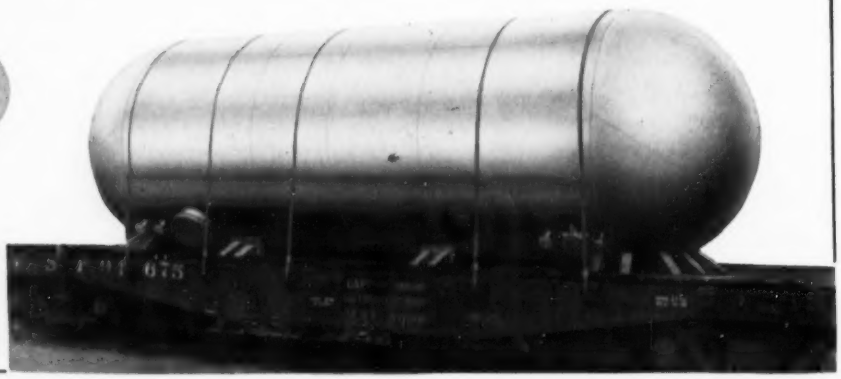
•COLE pioneered in building the *first* tank for nitrate solutions. We can supply you with welded aluminum tanks or pressure vessels for the storage or processing of agricultural chemicals, built to ASME specifications to meet all insurance requirements.

Pressure storage and corrosion-resistant storage facilities are typical of the many types of tanks we build especially for the fertilizer industry. Take advantage of our 103 years of specialized knowledge and experience. Write for booklet, *Tanks and Equipment for the Plant Food Industry.*

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Problem

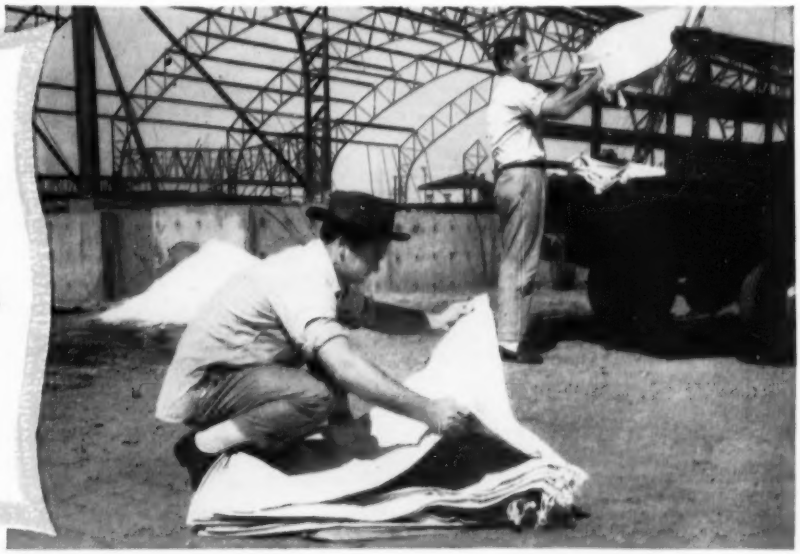
Throw-away bags that throw away profit



A manufacturer of building materials realized that delivering special materials to new job sites was becoming increasingly costly. The reason—his products were packed in bags that could be used only once and then were thrown away.

Fulton's Solution:

Bags that can be re-used 30 times



Fulton designed a sift-proof textile bag that can be emptied and re-used 30 times or more. For additional economy, draw-string openings afford easy filling and emptying that cut labor costs.

For your packaging or protection problem . . .
Let our Special Services Division show how Fulton products can answer your requirements. We manufacture a complete line of multiwall paper and textile bags, industrial fabrics and made-up textile items. Write: 1418 Annunciation Street, New Orleans, La.

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Now on stream, curing
and awaiting your orders

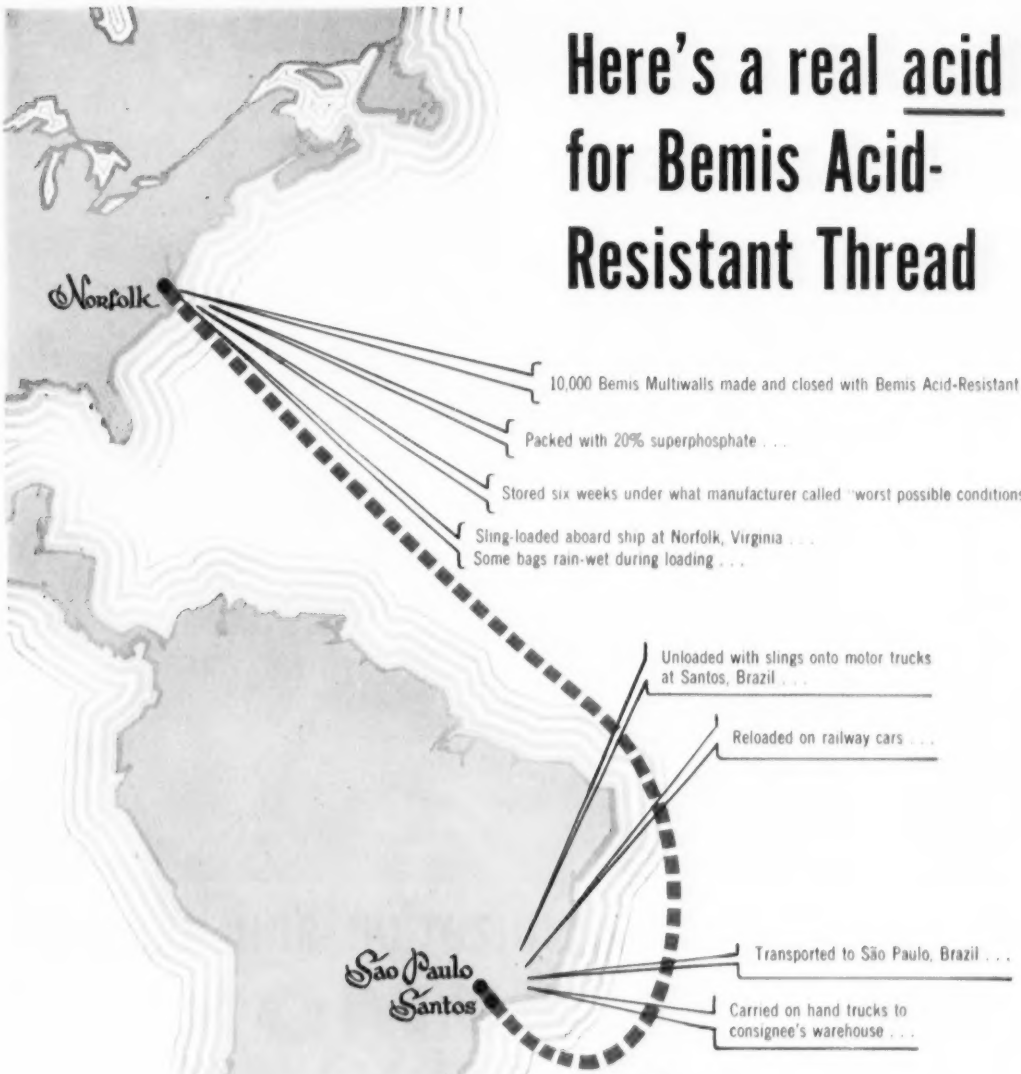
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and then . . .

The bags and the Bemis Acid-Resistant Thread sewing were carefully checked by disinterested authorities* who reported, in an affidavit:

"It must be noted that the stitching or thread at the top or bottom of bags was in perfect condition . . . and suffered no weakening by the action of the goods."

Not a single failure for Bemis Acid-Resistant Thread in 10,000 bags in the toughest kind of actual performance test!

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At Du Pont's Belle Works, Belle, W. Va., spheres like these are used for storage of UAL solutions. A continuing modernization and expansion program at Belle will further increase production and quality.

Du Pont continues modernization and expands facilities for **URAMON**®
AMMONIA LIQUORS

Now Du Pont offers you even more dependable service with "Uramon" Ammonia Liquors. The extensive modernization program at Belle Works includes both expanded production facilities and a stepped-up research program.

Du Pont has been manufacturing urea-ammonia solutions for use in fertilizers since 1931. From this matchless background of broad experience come UAL products of outstanding dependability. For technical help and information on the "Uramon" Ammonia Liquors best suited to your mixing operations, write Du Pont.

HERE ARE OTHER IMPORTANT ADVANTAGES OF DU PONT URAMON® AMMONIA LIQUORS:

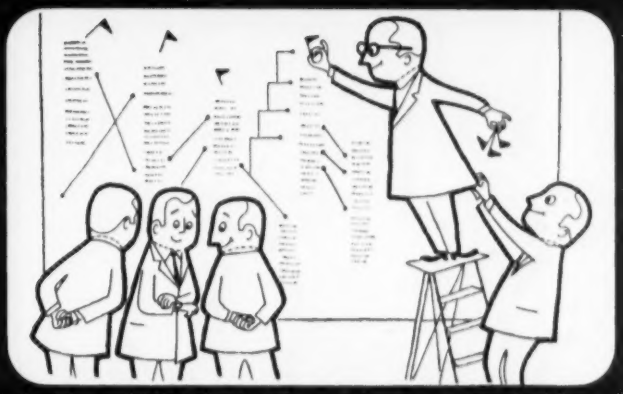
- High-quality nitrogen from UAL resists leaching . . . supplies both urea and ammonium forms of nitrogen.
- Safe in granulation . . . no danger of flash fires and less stack. Gives firm, uniform, stable granules, best for storage and application.
- Suitable for either batch or continuous mixing.
- Gives mixed goods better "feel"—minimizes caking, segregation and dusting.
- Won't corrode regular fertilizer manufacturing equipment, including ordinary steel and aluminum.

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URAMON®
AMMONIA LIQUORS
BETTER THINGS FOR BETTER LIVING . . . *THROUGH CHEMISTRY*

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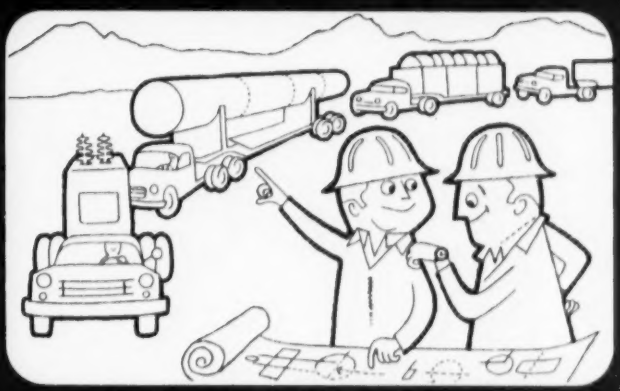
Your choice of Lummus to build your new plant is the starting gun in a race to meet or beat the completion date.



First, Lummus' Coordinating Group sets up a master schedule, a timetable for all activities on the project.



Deadlines are set for supplying critical information to design, engineering and construction groups . . .



. . . and for the purchase and delivery of key equipment in the proper construction sequence.



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All together, these things mean on-time completion . . . an art Lummus has reduced to a science.

How to beat the clock for $10,000,000

Not least among the skills required to build a multi-million dollar process plant is the ability to make the whole intricate job come out on time. The day you sign a contract with Lummus, a group of specialists in the art of getting things done goes into action. Their work continues without let-up until the last instrument is recording process data. Here is another reason why it's faster—and usually more economical—to let Lummus design, engineer and build your new plant than to risk your start-up date on a do-it-yourself approach.

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We welcome the opportunity to advise on your immediate problems.

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ASSOCIATES
COMPANY
ATLANTA • CHICAGO

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RESEARCH RESULTS & REPORTS

More than 130 farmers in Western Kentucky have cooperated in a test of diammonium phosphate fertilizer as developed by TVA. They report some easily-broken soft caking which caused no spreading difficulties. Care was needed in placement because the grades used were 10-30-20, 6-24-24; 10-20-20; 8-24-16 and 9-18-27.

O

FAO has stressed a daring program to reclaim barren lands around the Mediterranean by reforestation, irrigation and controlled crop planting. This was among the leading subjects discussed at the recent 26th session of the UN Food and Agriculture Organization.

O

Trees growing well and looking healthy need not be fertilized, but if it looks unhealthy or has been attacked by insects or disease, fertilizer will help it combat these conditions, according to the University of Missouri's L. E. McCormick.

O

Gum yield went up 23.8% and growth increased 36.6% when slash pine acreage near Lake City, Fla., was given 500 pounds of nitrogen to the acre annually over a four year test.

O

Absorption of sprayed plant food by leaves varies with the nutritional condition of the plant food available at the roots, Michigan State researchers report.

Wetting agents not only do not help, they say, but actually cut down the amount of phosphorus the plants will absorb. Absorption and movement of nutrients climb, to a certain point, with the climbing temperature; the best temperature level being around 70° for phosphorus; 77-86° for potassium.

O

A Grant of $800 has been awarded Dr. James A. Foret of SW Louisiana Institute for testing of duPont's Uramite.

O

$25,000 has been awarded by the Rockefeller Foundation to support the 1958 meeting of the Inter-American Society of Plant Breeders, Plant Pathologists, Entomologists and Soil Scientists.

O

Quality of seed, soil type, fertility, moisture and seedbed preparation have proved more important than chemical seed treatment on a number of legumes and grasses tested by the New York AES, in preventing seed-borne diseases. Most forage crop seeds did not respond to chemical treatments, they say.

O

Heat resistance of plants can be improved by a new product reported by The Rainbow Color and Chemical Co., Northridge, California. With this method, saline soils located in hot summer climates can be used as good crop land, according to their preliminary test reports.

(Continued on page 74)

PURDUE MEETING IS SAMPLE OF FUTURE

Fifty fertilizer industry and state control chemists, meeting at Purdue University, May 17 and 18, made a first-hand study of the merits of two new chemical analysis methods important to the fertilizer industry, in connection with a program jointly by the Chemical Control Committee of the National Plant Food Institute and the University's Biochemical Department.

The 2-day school on chemical analysis was organized by Drs. E. D. Schall and F. W. Quackenbush of Purdue and Vincent Sauchelli, Chairman of the Institute's Chemical Control Committee. Thirty-five chemists from the fertilizer industry and 15 from state control laboratories attended the 2-day sessions.

Numerous methods are available to chemists for the determination of potassium in fertilizers and potash materials, among which the flame photometric and the chloroplatinate methods are widely used. Although the flame photometric has not yet been approved officially by the Association of Official Agricultural Chemists, it is very rapid and useful where the potassium content is known to be small. The chloroplatinate method, officially approved, is a gravimetric method and is time consuming and expensive to carry through. The new method demonstrated at the Purdue school is of the volumetric type. It is less expensive and compares favorably with the flame photometric method in speed and with the gravimetric method in accuracy.

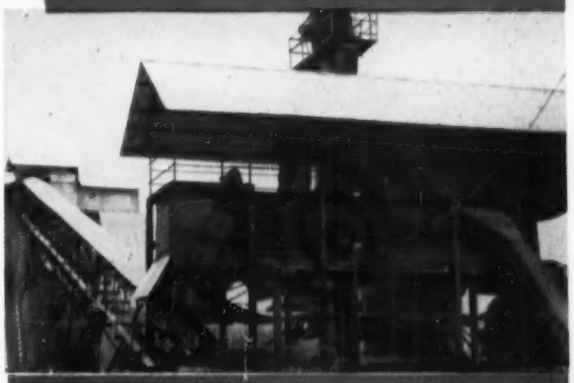
One of the purposes of the school was to familiarize the fertilizer chemical analysts with the procedures so that when a collaborative study on the method is later organized, the participants will be able to follow the procedures much more uniformly than is customarily the case.

The official method for determining nitrate nitrogen in the presence of a high content of chlorides has been criticized because nitrogen losses occur which penalize the manufacturer. New, modified procedures have been developed by several investigators.

Purdue University's Biochemistry Department demonstrated its modified procedure at this 2-day school. The attending chemists had the opportunity to analyze a sample by the new procedure which is known as the reduced iron method. Loss of nitrogen by the official method occurs when the concentration of the chloride ion exceeds that of the nitrate ion; the proposed reduced iron method prevents such loss. A collaborative study on this method is also being organized.

The Institute Chemical Control Committee is collaborating with Drs. Schall and Quackenbush of Purdue in the organization of the study in which both industry and state control chemists will participate. It is hoped that the results of the collaborative study will be available for presentation to the annual meeting of the Association of Official Agricultural Chemists this coming October and that, at least, a tentative approval of the two new procedures will be given at that time.

DAVIDSON-KENNEDY COMPANY



Continuous Acidulation Plants

Now even small and medium sized fertilizer operators can afford a D-K superphosphate plant with a continuous den and TVA cone mixer. Operating costs are unusually low. Two men can operate the plant at the continuous rate of 20 tons per hour.

An actual sample taken recently from a new plant at Opelousas, La. shows this remarkably high analysis before curing:

MOISTURE 7.24% A. P. A. 19.51%
T. P. A. 20.88% FREE ACID 3.18%
INSOLUBLES 1.37%

For complete information call:

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1090 Jefferson Street, N.W., Atlanta, Georgia

THE MAN WITH THE  MULTIWALL PLAN

UNION
PACKAGING SPECIALIST
J. R. GARMON

takes 40,000 lbs. off a packer's shoulders



Lifting twenty tons of filled bags a day is a lot of labor. It's inefficient, too, as a large chemicals producer learned during a recent survey of his Multiwall operation made by Union Packaging Specialist J. R. Garmon.

Garmon suggested a new system of *sliding* the customer's bags from the check-weigh scale to the bag flattener. This would not only relieve packer fatigue of manually lifting a 40,000 lb. bag load each day, but also assure full-capacity, full-time operation of the bagging equipment.

Union Multiwall Recommendations are based on this 5-star Packaging Efficiency Plan



- DESIGN
- EQUIPMENT
- CONSTRUCTION
- SPECIFICATION CONTROL
- PLANT SURVEY

Another recommended economy tip: redesign style, proportion, and construction of existing multiwall bags. This will result in annual savings of $1400 to $8000 for each 450 M of the various size bags used.

Such savings are not unusual when Union's 5-Star Packaging Efficiency Plan goes to work for a company. Write for complete information about this Plan. It costs nothing. There is no obligation.

Better Multiwall performance through better planning

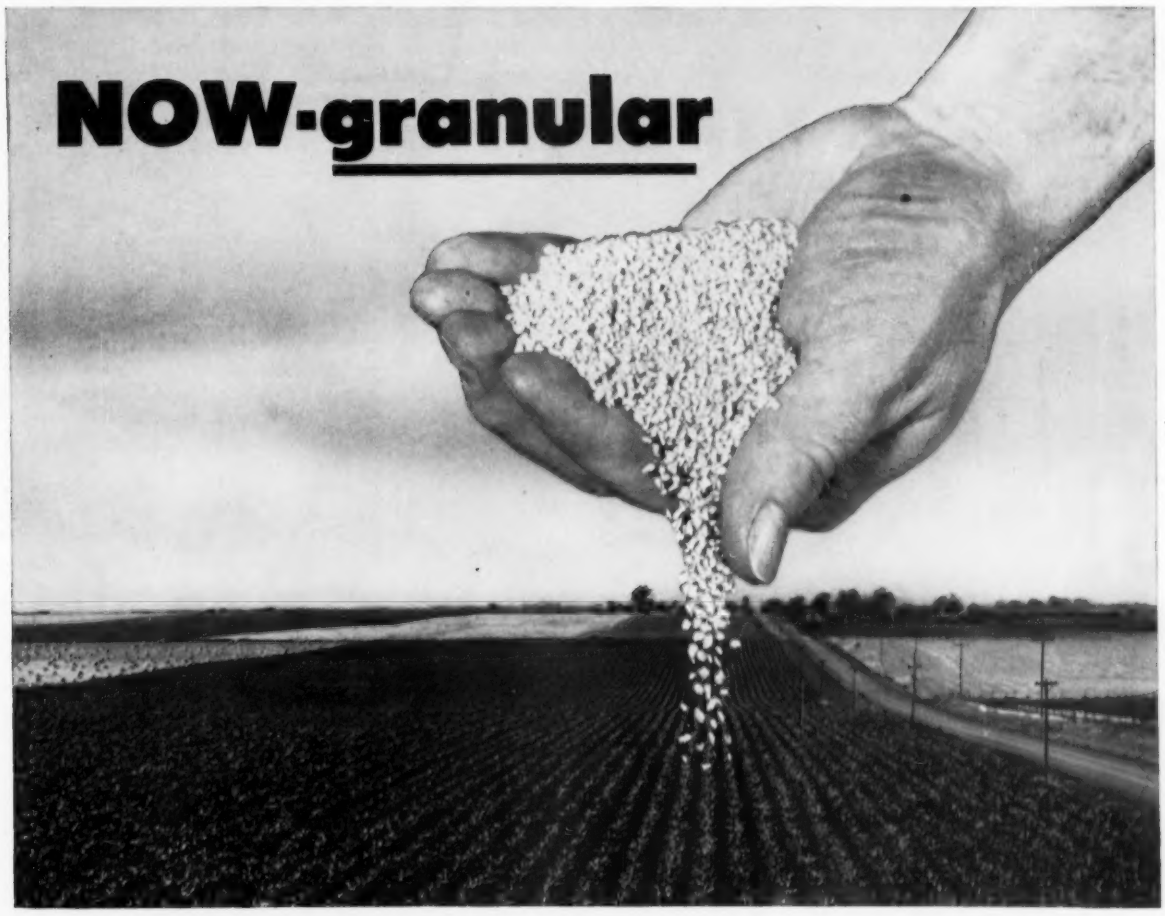
union camp

UNION'S PACKAGE ENGINEERING DEPARTMENT will study your Multiwall bagging methods and equipment and make appropriate recommendations, regardless of the brand of Multiwalls you are now using.

UNION MULTIWALL BAGS

UNION BAG-CAMP PAPER CORPORATION

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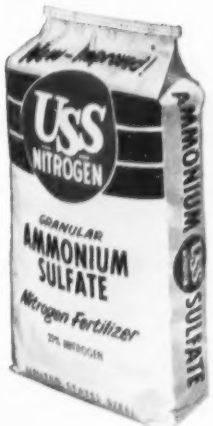
. . . USS Ammonium Sulfate

from United States Steel at Fairfield, Ala.

New equipment in our Fairfield, Alabama mills is now producing *granular* USS Ammonium Sulfate for Southern farms. Guaranteed 21% nitrogen, new USS Ammonium Sulfate is proving to be the most practical nitrogen fertilizer buy on the Southern market.

ALL-PURPOSE—Because USS Ammonium Sulfate is granulated, it's ideal for mixing with other granular materials or for direct application. This kiln-dried nitrogen fertilizer is free-flowing for easy handling. Top-dress, side-dress or spreading, USS Ammonium Sulfate fills the bill.

Make sure you're not caught short. Place your order for *granular* USS Ammonium Sulfate, today. It's available in bulk or bag.



USS Ammonium Sulfate

UNITED STATES STEEL



Notes from Pacific N.W. Plant Food Assn.

Leon Jackson, secretary of the Pacific Northwest Plant Food Association, writes that he is making his home his office. They get few phone calls, and—because parking is difficult downtown — almost no visitors. He will keep office hours until noon each day, and then circulate. So the Association's official address is now P. O. Box 4678, Portland 2, Oregon. And the phone, day or night, Leon says, is BE 6-5128.

The Association's own convention is set for Sun Valley, Idaho, arriving October 3, and the convention itself the next two days. As this winds up on Saturday, many will want to stay over for more Sun Valley fun.

* * *

The Scholarship Committees have been named by President McCollum as follows:

OREGON

Paul Willard, Meeker Fertilizer Co., Salem, Chairman.
Wm. Chorlton, Ore.-Wash. Fertilizer Co., Portland.
Don Campbell, Swift & Co., Portland.
Geo. Kitzmiller, Pac. Supply Coop., Portland.
Alec Runciman, Webfoot Fertilizer Co., Portland.

WASHINGTON

Norman Hibbert, The Anaconda Co., Yakima, Wash.
Sid Martin, Yakima Valley Spray Co., Yakima.
Ray Whitcomb, Link Distr. Co., Grandview.

IDAHO

Ernie Hansen, N'Land Industries, Lewiston.
Doug Jameson, Cominco Products, Spokane.
Dick Kube, Balfour, Guthrie & Co., Spokane.
Grant Braun, Am. Potash Institute, Portland.

The Association for several years has given $100 Scholarships to one student in the Soils Department of University of Idaho, Washington State College, and Oregon State College. These committees meet with a committee of staff members for the various colleges, and pick the successful candidates. Candidates are screened before meeting with the Selection Committee.

* * *

The Oregon Farm Demonstration held in May was a big success, and there will shortly be announcement of another field day for August.

Arcadian® News

Volume 2 | For Manufacturers of Mixed Fertilizers | Number 7

SUPERPHOSPHATE IS KEY TO FERTILIZER PROGRESS

Great Gains were made with Acidulation and Ammoniation

The greatest progress which has been accomplished in the manufacture of fertilizers in this country centers on superphosphate and is the result of industry research.

Research by fertilizer manufacturers developed: **1**) The production of superphosphate by the acidulation of phosphate rock. **2**) The production of nitrogen solutions for the ammoniation of superphosphate to provide an economical base for mixed fertilizers.

Superphosphate is the heart of a fertilizer technology which has supplied American farmers with millions of tons of efficient crop-producing power at low cost. And this technology is the fruit of industry initiative.

Superphosphate has many advantages over other phosphorus carriers. It is the lowest cost source of phosphorus. It contains large quantities of gypsum. Gypsum is an excellent soil conditioner and also provides large quantities of calcium and sulphur, both of which are essential plant foods.

Superphosphate supplies phosphorus that remains in the soil available to plants over a longer period than phosphorus from other carriers. Other forms of phosphorus have a greater tendency to become fixed in the soil in compounds that cannot be absorbed by plants.

Superphosphate will absorb more low-cost nitrogen through ammoniation with low-cost nitrogen solutions than any other form of phosphorus. Low-cost superphosphate and low-cost nitrogen solutions have enabled fertilizer manufacturers to supply farmers with low-cost, high-quality fertilizers.



Industry research in the ammoniation of superphosphate with nitrogen solutions has helped in the development of granular mixed fertilizers.

Industry research with ammoniated superphosphate has helped in the improvement of the condition of all types of fertilizers and helped in the development of granular fertilizers. High take-up of free ammonia by superphosphate is desirable in any fertilizer and particularly desirable in granular fertilizers. High rate of ammoniation provides nitrogen at low cost and also provides heat at an opportune time in the granulation process.

As long as fertilizer manufacturers continue to make the largest possible utilization of superphosphate and high levels of ammoniation, the situation favorable to the increased use of fertilizer will exist and flourish.

Arcadian News for Fertilizer Manufacturers . . . . . from NITROGEN DIVISION



GRASS...big fertilizer market!

Just look around you and everywhere you'll see a big, new fertilizer market growing up fast. It's grass!

Attractive lawns are the pride of modern homeowners, and the first goal of new residents. Fine, healthy turf is of top importance to parks, playgrounds and golf courses. New plants and offices that dot the suburbs and countryside are landscaped in grass. Millions of miles of highways are banked by grass.

Every year 1¼ million acres of land go out of farming and become homes, roads and factories. Most of this area is actually planted to grass.

The roll of the golf ball, the happiness of the Little Leaguer, the gratification of the homeowner and plant manager, the job of the greenskeeper, and the protection and beautification of our roadsides *all* depend on keeping grass growing well. And that takes special fertilizer.

Grass Needs Enduring Nitrogen

Yes, we all like good grass in our surroundings, but not all of us have it. Crop fertilizers used for turf often produce luxuriant growth for a few weeks, then grass comes to a standstill until more fertilizer containing nitrogen is applied.

Golf course superintendents have learned to keep greens and fairways fertilized throughout the year, but most persons can't be bothered. And there's no reason why they should be! Now wonderful new fertilizers containing N-dure* nitrogen provide enduring nitrogen that feeds grass thoroughly and evenly for months. It is ideal for ornamentals too, and for specialty crops.

Nitrogen Division research has perfected a combination of N-dure urea-formaldehyde solution and urea for use in fertilizers to make nitrogen available to plants at a uniform rate for months, instead of in a sudden splurge.

N-dure enables fertilizer manufacturers to provide economical, enduring nitrogen in mixing semi-granular, non-segregating, non-burning fertilizers. This golden liquid urea-formaldehyde solution, with additional urea, builds urea-form during the manufacturing process of making a chemically-controlled mixed fertilizer.

N-dure and urea in mixed fertilizers result in enduring nitrogen at economical cost, with no burning, no leaching and no harmful residues. Also, there's a saving of labor for the user.

You get non-dusting, semi-granular condition by using N-dure plus urea in making a lasting mixed fertilizer. Formation of ureaform in the process of mixing helps to reduce hazard of burning from other fertilizer salts as well as from nitro-



*Trade-mark

SINGLE APPLICATION OF FALL FERTILIZER SAVES WORK IN GROWING WHEAT

Several years of wheat fertilizer demonstrations on farms in 14 Ohio counties show that 1-1-1 ratio fertilizers produce better yields than low-nitrogen mixed fertilizers such as 3-12-12 or 5-14-14. Also, application at seeding time of 400 pounds of 10-10-10 gave as good yields as a split application of 200 pounds per acre of 10-10-10 in fall plus 200 pounds per acre in spring top-dressing. Over two seasons, average yield with fall application of 400 pounds of 10-10-10 was 38.9 bushels. With split application of 400 pounds of 10-10-10, yield was 38 bushels. With low-nitrogen mixed fertilizer, applied either in the fall or in split application, yield averaged 35.6 bushels.

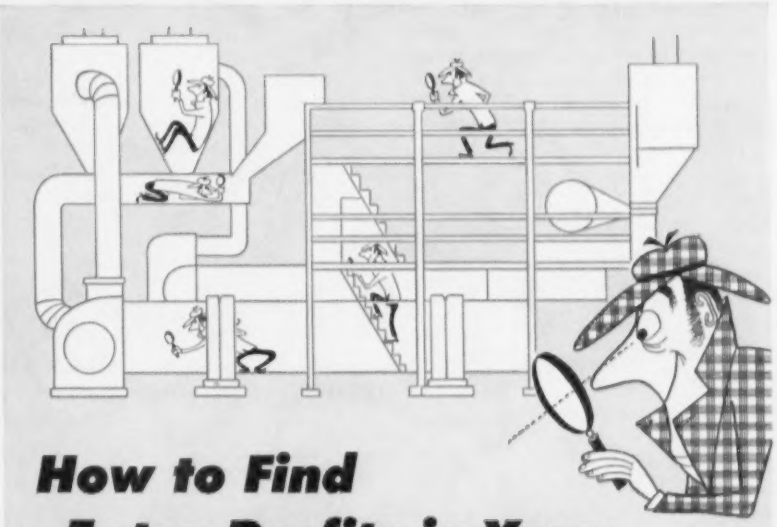
Highest yield on any farm using a single fall application of 400 pounds of 10-10-10 was 53.3 bushels. Highest yield with a split application of 400 pounds of 10-10-10 was 52.2 bushels. Best yield with a low-nitrogen fertilizer, 400 pounds of 5-10-10, was 45.7 bushels.

gen. In well-balanced mixed fertilizers, mixtures can be made in a wide variety of nitrogen ratios. You can easily control the ratio of lasting action to quick action with standard ammoniating equipment.

The fall months are a perfect time to fertilize grass and ornamentals, and this year more people than ever before will be in the market for fertilizer.

For full information on how N-dure can help you make profits from the growing turf and specialty market, write to Nitrogen Division, Allied Chemical, 40 Rector Street, New York 6, N.Y.





How to Find Extra Profits in Your 1957-58 Production Plans

In making plans for your 1957-58 production, the best place to look for bigger profits may be right in your own plant. Sometimes operating costs, higher than necessary, are "hiding" in a fertilizer plant that seems to be operating smoothly. If you can reduce these costs you will increase your profits.

One of the practical ways to pare down costs is to use the nitrogen solutions and other ingredients specifically adapted to the fertilizers you plan to produce. With the selection of the right methods and materials, you may be able to cut costs and improve quality in all your mixed fertilizers.

Why not get the help of a Nitrogen Division technical man? He will be glad to suggest immediate and economical changes to help you gear your output into a much more profitable operation. His services are available to Nitrogen Division customers without cost. Whether your problems are in ammoniation, formulation, granulation, condition, converting old equipment or selecting new, you can receive this technical service fast.

Manufacturing Know-how

Nitrogen Division maintains a large staff of trained technologists, experienced in all phases of the fertilizer business. The skills and abilities of hundreds of well-qualified scientists, technicians, and engineers are available to help work out your problems. This technical service staff uses millions of dollars' worth of laboratory and pilot plant equipment.

Ask your Nitrogen Division salesman to line up the technical aid essential to the solution of your problems. He can call for ready help that will come up with realistic answers to any fertilizer production situation. This Nitrogen Division service is based on 30 years of fertilizer and nitrogen experience.

Right in your own plant, as well as in their laboratories, Nitrogen Division technicians will work on your trouble spots until a practical answer develops. But they are more than trouble shooters. They have spent years in originating new and better nitrogen solutions to fit your manufacturing methods. Their goal is to help you streamline your plant operations to get best results, with the least possible change in equipment.

Their Full-time Job

If you contemplate production of mixed fertilizers new to your plant, their assistance will be of special benefit. Nitrogen Division technical men do not sell equipment. They spend their full time developing nitrogen solutions and helping organize production line systems for making high-quality, pulverized and granular fertilizers at low cost.

Extensive and continuing research by Nitrogen Division developed major innovations in fertilizer practice, such as ammoniation of superphosphate. Nitrogen Division knows fertilizer plant methods, inside and out! You can get prompt and efficient assistance from the technical service staff right now—and remember, it's without charge to customers. Talk to your Nitrogen Division salesman, or contact Nitrogen Division, Allied Chemical, 40 Rector St., New York, N. Y.

NITROGEN *plus* SERVICE

There are many reasons why it pays you to deal with Nitrogen Division, Allied Chemical. You are served by America's leading producer of the most complete line of nitrogen products. You benefit from millions of tons of nitrogen experience and the enterprising research that originated and developed nitrogen solutions for the fertilizer industry. You are assured of dependable supplies from three huge plants at Hopewell, Ironton, and Omaha. Your nitrogen is delivered to you by the best transportation facilities and equipment. You get technical assistance and formulation advice from the largest and most efficient staff of nitrogen experts. Your sales are supported by the most powerful advertising campaign ever conducted to sell fertilizers. Nitrogen Division is your headquarters for NITROGEN *plus* SERVICE. Look over the big line and contact one of the 14 offices listed below.

Arcadian® Nitrogen Solutions

	CHEMICAL COMPOSITION %					PHYSICAL PROPERTIES		
	Total Nitrogen	Anhydrous Ammonia	Ammonium Nitrate	Urea	Water	Approx. Sp. Grav. at 60° F	Approx. Vap. Press. at 104° F per Sq. In. Gauge	Approx. Temp. at Which Salt Begins to Crystallize °F
NITRANA®								
2	41.0	22.2	65.0	—	12.8	1.137	10	21
2M	44.0	23.8	69.8	—	6.4	1.147	18	26
3	41.0	26.3	55.5	—	18.2	1.079	17	-25
3M	44.0	28.0	60.0	—	12.0	1.083	25	-36
3MC	47.0	29.7	64.5	—	5.8	1.089	34	-30
4	37.0	16.6	66.8	—	16.6	1.188	1	56
4M	41.0	19.0	72.5	—	8.5	1.194	7	61
6	49.0	34.0	60.0	—	6.0	1.052	48	-52
7	45.0	25.3	69.2	—	5.5	1.134	22	1
URANA®								
10	44.4	24.5	56.0	10.0	9.5	1.108	22	-15
11	41.0	19.0	58.0	11.0	12.0	1.162	10	7
12	44.4	26.0	50.0	12.0	12.0	1.081	25	- 7
13	49.0	33.0	45.1	13.0	8.9	1.033	51	-17
15	44.0	28.0	40.0	15.0	17.0	1.052	29	1
U-A-S®								
A	45.4	36.8	—	32.5	30.7	0.925	57	16
B	45.3	30.6	—	43.1	26.3	0.972	48	46
Anhydrous Ammonia	82.2	99.9	—	—	—	0.618	211	—

Other ARCADIAN® Nitrogen Products: UREA 45 • A-N-L® Nitrogen Fertilizer Ammonium Nitrate • American Nitrate of Soda • Sulphate of Ammonia

NITROGEN DIVISION Allied Chemical & Dye Corporation

MAIN OFFICE: 40 Rector Street, New York 6, N. Y., Phone: Hanover 2-7300

Branch Offices	Phone
Hopewell, Va., P. O. Drawer 131	Cedar 9-6301
Ironton, Ohio, P. O. Box 98	Ironton 8-4366
Omaha 7, Neb., P. O. Box 166	Bellevue 1464
Raleigh, N. C., 16 W. Martin St.	Temple 3-2801
Columbia 1, S. C., 1203 Gervais St.	Columbia 3-6676
Atlanta 3, Ga., 127 Peachtree St., N. E.	Jackson 2-7805
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Los Angeles 5, Cal., 2999 West 6th St.	Dunkirk 8-3201
San Francisco 4, Cal., 235 Montgomery St.	Yukon 2-6840

Consumption of

COMMERCIAL FERTILIZERS and Primary Plant Nutrients in the United States

. . . Year Ended June 30, 1956

by

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The consumption of fertilizers in the United States and Territories (Hawaii and Puerto Rico) in the year ended June 30, 1956, amounted to 22,193,070 tons. This was a decrease of 533,392 tons from the quantity (22,726,462 tons) used in the preceding year. The 1955-56 consumption of fertilizers comprised 21,403,465 tons of products containing one or more of the primary plant nutrients (N, P_2O_5, K_2O), and 789,605 tons of the secondary and trace nutrient materials which did not contain these nutrients. The quantity of products containing primary nutrients was 531,391 tons

Table 1—Consumption of Fertilizers, Year Ended June 30, 1956[1]

State and Region	Mixtures			Materials[2]			Grand Total	Compared with Year Ended June 30, 1955	
	July 1–Dec. 31, 1955	Jan. 1–June 30, 1956	Total	July 1–Dec. 31, 1955	Jan. 1–June 30, 1956	Total		Fertilizers[3]	Total N, Avail. P_2O_5 & K_2O
	Tons	Tons	Tons	Tons	Tons	Tons	Tons	Percent	Percent
Maine	10,654	167,361	178,015	1,456	3,896	5,352	183,367	101	103
New Hampshire	1,622	10,553	12,175	1,317	2,835	4,152	16,327	89	89
Vermont	3,078	29,458	32,556	10,375	7,768	18,143	50,699	104	106
Massachusetts	9,350	49,158	58,508	4,340	11,426	15,766	74,274	87	86
Rhode Island	1,412	11,709	13,121	354	1,431	1,785	14,906	90	87
Connecticut	6,845	46,350	53,195	4,421	19,068	23,489	76,684	87	91
New England	32,981	314,589	347,570	22,263	46,424	68,687	416,257	95	98
New York	111,267	381,250	492,517	26,455	54,953	81,408	573,925	91	93
New Jersey	43,806	195,357	239,163	6,429	16,711	23,140	262,303	92	94
Pennsylvania	170,294	414,943	585,237	21,699	45,625	67,324	652,561	92	95
Delaware	12,921	67,730	80,651	1,034	3,692	4,726	85,377	89	93
District of Columbia	449	1,326	1,775	297	469	766	2,541	90	92
Maryland	66,983	198,673	265,656	5,475	10,270	15,745	281,401	88	89
West Virginia	16,167	58,718	74,885	3,292	6,712	10,004	84,889	104	104
Middle Atlantic	421,887	1,317,997	1,739,884	64,681	138,432	203,113	1,942,997	92	94
Virginia	150,983	521,580	672,563	20,675	84,626	105,301	777,864	96	97
North Carolina	200,189	1,150,965	1,351,154	49,003	301,261	350,264	1,701,418	92	92
South Carolina	89,212	525,991	615,203	30,865	218,022	248,887	864,090	93	97
Georgia	178,973	820,141	999,114	54,816	217,126	271,942	1,271,056	99	103
Florida	305,789	695,672	1,201,461	54,038	83,480	137,518	1,338,979	102	109
South Atlantic	1,125,146	3,714,349	4,839,495	209,397	904,515	1,113,912	5,953,407	97	99
Ohio	293,150	692,167	985,317	16,588	48,226	64,814	1,050,131	97	97
Indiana	229,030	691,973	921,003	26,408	116,572	142,980	1,063,983	92	97
Illinois	146,542	368,395	514,937	365,146	480,375	845,521	1,360,458	112	98
Michigan	172,897	405,834	578,731	13,026	36,241	49,267	627,998	98	103
Wisconsin	65,242	314,619	379,861	9,871	22,542	32,413	412,274	96	102
East North Central	906,861	2,472,988	3,379,849	431,039	703,956	1,134,995	4,514,844	100	99
Minnesota	47,788	241,535	289,323	15,469	63,316	78,785	368,108	98	102
Iowa	82,805	223,038	305,843	49,143	94,320	143,463	449,306	77	77
Missouri	180,880	273,888	454,768	179,345	176,296	355,641	810,409	119	105
North Dakota	2,866	20,992	23,858	7,981	37,329	45,310	69,168	110	115
South Dakota	1,737	7,684	9,421	4,210	12,969	17,179	26,600	70	76
Nebraska	3,708	16,802	20,510	22,196	90,284	112,480	132,990	64	79
Kansas	48,509	29,565	78,074	68,113	61,557	129,670	207,744	89	93
West North Central	368,293	813,504	1,181,797	346,457	536,071	882,528	2,064,325	94	92
Kentucky	61,565	370,689	432,254	28,074	74,807	102,881	535,135	102	105
Tennessee	88,799	321,409	510,208	29,888	76,043	105,931	516,139	97	103
Alabama	126,327	679,496	805,823	69,162	223,909	293,071	1,098,894	95	99
Mississippi	19,648	312,768	332,416	175,589	242,217	417,806	750,222	104	105
East South Central	296,339	1,684,362	1,980,701	302,713	616,976	919,689	2,900,390	99	103
Arkansas	29,879	145,352	175,231	29,882	158,206	188,088	363,319	109	117
Louisiana	29,992	133,602	163,524	34,108	105,853	139,961	303,485	95	100
Oklahoma	34,604	41,928	76,532	34,912	24,060	58,972	135,504	107	110
Texas	87,671	200,131	287,802	106,122	172,579	278,701	566,503	96	107
West South Central	182,076	521,013	703,089	205,024	460,698	665,722	1,368,811	100	108
Montana	903	2,834	3,737	10,010	19,221	29,231	329,968	137	135
Idaho	426	4,956	5,382	14,846	44,191	59,037	64,419	57	70
Wyoming	66	1,773	1,839	1,078	8,062	9,140	10,979	100	98
Colorado	2,752	9,289	12,041	8,400	33,109	41,509	53,550	111	112
New Mexico	314	1,517	1,831	5,169	21,990	27,159	28,990	89	92
Arizona	3,788	13,685	17,473	53,562	82,529	136,091	153,564	94	103
Utah	576	3,950	4,526	3,359	23,099	26,458	30,984	111	117
Nevada	477	570	1,047	1,152	2,083	3,235	4,282	176	166
Mountain	9,302	38,574	47,876	97,576	234,284	331,860	379,736	90	99
Washington	6,052	29,902	35,954	47,423	86,462	133,885	169,839	85	90
Oregon	4,550	21,900	26,450	30,099	113,394	143,493	169,943	99	100
California	85,351	161,143	246,494	691,527	975,582	1,667,109	1,913,603	107	110
Pacific	95,953	212,945	308,898	769,049	1,175,438	1,944,487	2,253,385	104	106
Continental U. S.	3,438,838	11,090,321	14,529,159	2,448,199	4,816,794	7,264,993	21,794,152	98	99
Hawaii	34,782	30,603	65,385	40,941	59,758	100,699	166,084	106	107
Puerto Rico	72,293	108,816	181,109	19,498	32,227	51,725	232,834	82	84
Alaska[4]	.....	.....	.....	.....	.....	.....	.....	...	...
Territories	107,075	139,419	246,494	60,439	91,985	152,424	398,918	90	93
Total: 1955-56	3,545,913	11,229,740	14,775,653	2,508,638	4,908,779	7,417,417	22,193,070	98	99
1954-55	3,621,898	11,725,952	15,347,850	2,504,621[5]	4,873,991[6]	7,378,612	22,726,462	100	100
1953-54	3,370,022	12,171,054	15,541,076	2 603,399	4,629,024	7,232,423	22,773,499	101	96

[1] Includes: Ground phosphate rock, basic slag, secondary and trace nutrient materials, such as, borax, sulfur, magnesium sulfate, etc., used as separate materials, also fertilizers distributed by Government agencies. Does not include liming materials, but includes gypsum.
[2] Does not include the quantities of materials used for manufacture of commercial mixtures.
[3] Fertilizers which were guaranteed to contain one or more of the primary plant nutrients (N, P_2O_5, K_2O).
[4] Data not available—estimated less than 1500 tons.
[5] Revised by deletion of 737 tons of basic slag from Pennsylvania total and addition of 6,426 tons of gypsum to North Carolina total.
[6] Revised by deletion of 7,804 tons of basic slag from Pennsylvania total and addition of 4,872 tons of gypsum to North Carolina total.

Table 1a—Regional change in consumption of fertilizers in year ended June 30, 1956, from that in the preceding year.

Region	Tons			Percent		
	Mixtures	Materials[1]	Total	Mixtures	Materials[1]	Total
New England	— 17,491	— 5,890	— 23,381	— 4.79	— 7.90	— 5.32
Middle Atlantic	—158,999	— 18,517	—177,516	— 8.37	— 8.35	— 8.37
South Atlantic	— 88,742	— 49,700	—138,442	— 1.80	— 4.27	— 2.27
East North Central	—141,796	+139,414	— 2,382	— 4.03	+14.00	— .05
West North Central	—102,598	— 17,376	—119,974	— 7.99	— 1.93	— 5.49
East South Central	— 32,145	— 3,454	— 35,599	— 1.60	— .37	— 1.21
West South Central	— 5,093	+ 7,052	+ 1,959	— .72	+ 1.07	+ .14
Mountain	— 3,423	— 42,330	— 45,753	— 6.67	—11.31	—10.75
Pacific	+ 11,259	+ 37,249	+ 48,508	+ 3.78	+ 1.95	+ 2.20
Continental U. S.	—539,028	+ 46,448	—492,580	— 3.58	+ .64	— 2.21
Territories	— 33,169	— 7,643	— 40,812	—11.86	— 4.77	— 9.28
Total	—572,197	+ 38,805	—533,392	— 3.73	+ .52	— 2.35

[1]Including secondary and trace nutrient materials.

(2.42 percent) below that (21,934,856 tons) in 1954-55. The consumption of materials that did not contain primary nutrients was 2,001 tons (0.25 percent) below the quantity (791,606 tons) used in the preceding year.

Fertilizers used in 1955-56 contained 6,054,741 tons of nitrogen, available P_2O_5, and K_2O, or 64,398 tons (1.05 percent) less than in 1954-55. This was the first time in 17 consecutive years that the total consumption of primary nutrients failed to increase. The use of nitrogen decreased 27,933 tons (1.42 percent) to 1,932,603 tons, that of available P_2O_5 36,240 tons (1.59 percent) to 2,247,420 tons, and that of K_2O 225 tons (0.01 percent) to 1,374,718 tons. The amount of total P_2O_5 increased 46,699 tons (1.80 percent) to 2,643,418 tons, owing principally to the increase in the direct use of phosphate rock which is estimated to have contained an average of 32 percent of total P_2O_5 but only 3 percent of available P_2O_5.

In 1955-56 the average primary nutrient content of fertilizers bearing primary nutrients was 28.29 percent as compared with 27.90 percent in 1954-55.

The data presented herein were compiled from manufacturers' reports of shipments to agents, dealers, distributors, and consumers in the Territories (except Alaska), the District of Columbia, and the States (except California, Florida, Massachusetts, Missouri, North Carolina, South Carolina, and Texas). For the latter seven States the data were compiled chiefly from the reports of the respective fertilizer control officials. No data were available for Alaska. Supplementary information was furnished by the control offices and other State agencies, as well as by fertilizer brokers, and special inquiries were made of all known distributors and custom applicators of anhydrous ammonia and nitrogen solutions.

The quantities are reported as 2,000-pound tons. Although the data refer to shipments, the terms "consumption," "sales," and "shipments" are used synonymously. The actual consumption differs slightly, no doubt, from either the shipments or sales.

ALL FERTILIZERS

The consumption of the two classes of fertilizers (mixtures and materials) is summarized by States and Regions in table 1. In only two regions—the West South Central and Pacific—were slight gains made, while in the other regions consumption was lower by amounts ranging up to nearly 11 percent as compared with the preceding year (table 1a). In 1955-56 approximately 64 percent of the decrease in fertilizer tonnage occurred in the three Atlantic coast regions. Among the other areas the West North Central region accounted for the highest proportion (22.5 percent) of the decrease.

In Hawaii and in each of 16 States scattered through every region, the consumption of all fertilizers was higher in 1955-56 than in the preceding year. These units, which in 1955-56 accounted for 35.52 percent of the United States consumption of fertilizer, showed a total gain of 587,222 tons (7.45 percent) over their consumption in 1954-55.

Compared with the tonnages in each six-month period of 1954-55, most of the decrease in total consumption of fertilizers occurred in the January-June period of 1955-56. Consumption in this period was 461,424 tons (2.78 percent) lower, while in the July-December period consumption was 71,938 tons (1.17 percent) lower.

In table 1, the percentage change in consumption of fertilizers in 1955-56 from the level in 1954-55 is based on the tonnage of primary nutrient containing fertilizers only, in order that a direct comparison may be made with the percentage change in the quantities of the primary nutrients themselves.

MIXTURES

In 1955-56 the total consumption of commercial mixed fertilizers amounted to 14,775,653 tons, or 66.58 percent of the quantity of fertilizers. There were 1,536 grades reported. In addition, approximately 500 mixtures, not reported by grades, were used in California and the quantities of an unknown number reported by manufacturers in other States.

The total consumption of mixed fertilizers in 1955-56 was 572,197 tons (3.73 percent) less than in the preceding year (table 1a), and the quantity decreased in each of the regions except the Pacific which showed an increase of 3.78 percent.

In the Continental United States, there were 171 grades consumed in individual amounts of 3,000 tons or more (table 2). These totaled 13,973,318 tons and accounted for 96.17 percent of the quantity of mixtures used on the Continent. Other grades consumed in this area numbered 1,231 and amounted to 358,045 tons (2.46 percent). The balance (197,796 tons, 1.37 percent) represented mixtures not reported by grades.

Consumption of mixtures in Hawaii and Puerto Rico amounted to 246,494 tons in 168 grades. While many of the grades in Puerto Rico are similar to those used on the Continent, most of those in Hawaii are designated in fractional numbers.

In 1955-56, four ratios of the primary nutrients (N:available P_2O_5:K_2O) accounted for 50.63 percent of the total consumption of mixed fertilizers in the Continental United States (table 2a). Individually, the proportions were 17.42, 13.88, 10.86, and 8.47 percent for the 1:4:4, 1:2:2, 1:1:1, and 1:3:3 ratios, respectively.

Table 2a—Ratios of primary nutrients of mixed fertilizers consumed in largest tonnage in the Continental U. S., year ended June 30, 1956.

Nutrient ratio[1]	Consumption	Proportion of quantity of all mixed fertilizers
	tons	percent
1:4:4	2,531,259	17.42
1:2:2	2,017,105	13.88
1:1:1	1,578,374	10.86
1:3:3	1,230,328	8.47
Total	7,357,066	50.63

[1]N:available P_2O_5:K_2O.

The 15 grades consumed in largest

tonnages in 1955-56 in each of the Continental regions and Puerto Rico are shown in table 3, together with the quantities for each State in the region. Excepting California, Colorado, Washington, Wyoming, and the District of Columbia, these grades accounted for 50 percent or more of the total consumption of mixtures in each of the States and Puerto Rico. At least 12 of the grades were among the 15 consumed in largest tonnages in each of the areas in the preceding year, but not always in the same order of tonnage.

Though 171 grades consumed in the Continental U. S. represented 96.17 percent of the total tonnage of mixed fertilizers used in this area, 15 of these (table 3) accounted for 62.56 percent of the tonnage. These 15 were the same as those in 1954-55 except that the 6-12-12 grade replaced the 4-8-8 grade. The weighted average guaranteed nutrient content of the 15 grades was 4.80 percent nitrogen, 12.12 percent available P_2O_5, and 11.30 percent K_2O (total, 28.22 percent) as compared, respectively, with 4.51, 11.80, and 10.86 percent (total, 27.17 percent) in the preceding year. The proportionate increase in the concentration of nitrogen and potash were higher than in that of P_2O_5.

In 1955-56 the 5-10-10 grade was consumed in largest tonnage, while in each of the preceding 6 years the 3-12-12 grade showed the largest consumption.

The consumption of mixtures by classes (N-P-K, N-P, P-K, N-K) for each region and the United States is shown in table 5. Except for the Mountain region, N-P-K mixtures were used in much larger quantities than the other classes. More than 80 percent of the tonnage of all mixtures consumed in each of the other regions was of this class, while in the Mountain region the tonnages of N-P-K and N-P mixtures were nearly equal. In 1955-56 for the United States and Territories, 90.80 percent of the tonnage of all mixtures was of the N-P-K class, while for the other classes—N-P, P-K, N-K—consumption was 1.96 percent, 5.73 percent, and 1.51 percent of the total tonnage, respectively. The proportions were only slightly different in 1954-55.

The average primary nutrient content of all mixtures consumed in each State and Territory is shown in table 7. Compared with 1954-55 the averages for the 51 political units in 1955-56 showed for nitrogen,

Table 2—Consumption of Principal Mixed Fertilizers in the Continental United States, by Grades, Years Ended June 30, 1955 and 1956

Grade	Consumption[1]		Proportion of Total	
	1955	1956	1955	1956
	Tons	Tons	Per-cent	Per-cent
0-8-24	5,115	5,540	0.03	0.03
0-9-27	16,885	11,816	.11	.08
0-10-10	2,965	3,547	.02	.03
0-10-20	55,695	62,640	.37	.43
0-10-30	45,605	41,660	.30	.29
0-12-12	28,720	20,064	.19	.13
0-12-20	11,983	16,373	.08	.12
0-12-36	7,691	10,707	.05	.07
0-14-10	5,108	3,394	.04	.02
0-14-14	129,982	174,442	.86	1.21
0-15-30	16,380	15,256	.11	.10
0-15-45	3,154	4,879	.02	.03
0-16-8	25,190	46,697	.17	.33
0-20-10	16,079	11,335	.10	.07
0-20-20	341,795	310,275	2.27	2.14
0-24-24	7,522	8,912	.05	.06
0-25-25	10,333	17,837	.07	.12
0-30-15	9,255	11,587	.06	.08
0-30-30	18,623	20,984	.13	.15
2-10-8	6,173	4,150	.04	.03
2-12-6	44,391	27,156	.29	.18
2-12-12	438,393	400,811	2.91	2.76
3-8-8	12,084	9,173	.08	.06
3-9-6	494,506	367,517	3.28	2.53
3-9-9	494,438	478,163	3.28	3.29
3-9-12	28,624	33,474	.19	.24
3-9-15	11,291	8,400	.08	.05
3-9-18	80,324	70,990	.53	.49
3-9-27	109,446	95,000	.73	.66
3-12-6	210,639	152,357	1.40	1.04
3-12-12	1,413,525	1,171,479	9.38	8.07
3-18-9	50,074	41,699	.33	.28
4-4-2	3,013	5,050	.02	.04
4-6-6	11,965	8,503	.08	.06
4-6-8	43,472	38,981	.29	.27
4-7-5	117,706	113,248	.78	.79
4-8-4	12,799	11,311	.08	.08
4-8-6	248,738	190,357	1.65	1.31
4-8-8	280,857	219,923	1.87	1.51
4-8-10	97,526	115,008	.64	.79
4-8-12	56,399	53,139	.38	.37
4-9-3	69,566	63,442	.46	.43
4-10-6	424,671	368,797	2.82	2.54
4-10-7	640,994	469,543	4.25	3.23
4-10-8	2,365	3,071	.02	.03
4-10-10	8,649	10,657	.06	.07
4-12-4	104,024	84,300	.69	.58
4-12-8	149,971	146,648	.99	1.01
4-12-12	501,692	737,215	3.33	5.07
4-12-16	3,514	3,071	.03	.02
4-16-8	30,901	23,225	.20	.16
4-16-16	702,756	615,596	4.66	4.24
4-24-12	38,088	24,865	.26	.17
5-3-6	3,802	3,559	.02	.03
5-5-5	6,912	3,391	.05	.02
5-5-8	6,551	7,085	.04	.05
5-6-6	3,535	3,719	.03	.02
5-6-8	12,764	9,399	.08	.07
5-7-5	21,400	22,008	.14	.15
5-8-5	1,641	3,964	.01	.03
5-8-7	14,311	10,294	.10	.07
5-8-8	3,653	5,307	.02	.03
5-10-5	764,044	678,083	5.07	4.67
5-10-10	1,379,753	1,296,912	9.16	8.93
5-10-15	111,158	128,086	.74	.88
5-10-20	8,761	8,589	.06	.06
5-10-30	377	3,317	[2]	.02
5-15-10	7,718	3,980	.05	.03
5-15-15	18,010	6,009	.12	.04
5-15-30	5,310	6,298	.03	.04
5-20-10	55,880	58,433	.37	.41
5-20-20	564,263	699,511	3.75	4.81
5-40-0	0	5,966	0	.04
6-3-6	23,415	14,094	.15	.10
6-4-6	15,292	19,139	.11	.13
6-4-8	38,744	43,944	.25	.30
6-4-12	924	3,963	.01	.03
6-6-6	77,092	85,327	.51	.59
6-6-8	16,469	31,430	.11	.21
6-6-12	11,492	9,934	.08	.07
6-6-18	13,616	11,070	.09	.08
6-7-7	4,757	4,126	.03	.03
6-8-2	2,938	5,281	.02	.03
6-8-4	123,438	104,043	.82	.72
6-8-6	159,826	123,735	1.06	.85
6-8-8	264,922	268,288	1.76	1.85
6-8-12	23,125	24,559	.15	.17
6-9-3	5,708	5,280	.04	.03
6-9-6	8,983	8,802	.06	.06
6-9-9	6,329	3,601	.04	.03
6-9-10	0	4,094	0	.03
6-9-12	51,069	36,971	.34	.25
6-10-4	71,995	77,937	.48	.54
6-10-8	3,629	5,819	.02	.04
6-12-4	3,278	3,944	.02	.02
6-12-6	51,456	41,708	.34	.29
6-12-12	280,573	334,595	1.86	2.30
6-12-15	2,212	3,360	.02	.03
6-12-18	2,516	6,610	.02	.04
6-18-6	588	3,215	[2]	.02
6-18-18	2,491	8,834	.02	.07
6-20-20	4,501	4,499	.03	.03
6-24-0	13,397	7,909	.09	.05
6-24-12	65,377	84,454	.43	.58
6-24-24	22,433	44,673	.15	.31
7-7-7	29,851	24,767	.20	.17
7-8-8	5,705	7,705	.03	.05
7-9-9	3,366	3,737	.03	.03
7-14-7	2,733	3,902	.01	.03
8-0-8	16,007	12,278	.11	.08
8-0-12	6,465	5,820	.04	.04
8-0-24	20,395	21,111	.14	.15
8-3-8	1,580	12,252	.01	.08
8-4-6	2,108	6,150	.01	.04
8-4-8	41,629	37,168	.28	.26
8-6-4	5,610	6,908	.04	.05
8-6-6	4,159	4,004	.02	.02
8-6-8	3,721	20,456	.03	.14
8-8-4	19,033	16,218	.13	.12
8-8-8	226,634	207,987	1.50	1.43
8-9-10	7,641	8,164	.05	.06
8-10-12	11,976	11,169	.08	.07
8-12-12	39,478	55,748	.26	.39
8-12-16	17,501	16,119	.12	.11
8-16-8	5,860	6,189	.04	.04
8-16-16	126,175	140,341	.83	.97
8-24-0	2,624	5,479	.02	.03
8-24-8	85,837	72,908	.57	.51
8-24-12	9,418	13,576	.06	.09
8-32-0	63,110	60,377	.42	.42
9-6-6	10,089	10,609	.07	.07
9-9-9	3,879	10,906	.03	.07
9-36-0	3,324	3,006	.02	.02
10-0-8	2,204	4,020	.01	.03
10-0-10	29,688	22,687	.20	.16
10-0-12	4,714	3,700	.03	.02
10-2-10	1,010	5,504	.01	.04
10-4-10	3,753	4,808	.02	.03
10-5-5	3,067	3,657	.02	.03
10-6-4	40,540	42,175	.27	.29
10-10-0	8,703	8,445	.06	.06
10-10-5	23,529	22,569	.16	.15
10-10-10	725,133	659,090	4.81	4.54
10-15-15	4,824	6,108	.03	.04
10-16-8	7,661	8,274	.05	.06
10-20-0	102,526	63,825	.68	.44
10-20-10	86,642	121,165	.58	.83
10-20-20	15,143	23,440	.10	.16
10-30-10	5,211	4,684	.03	.04
11-8-4	3,131	4,891	.02	.03
12-0-10	19,820	13,570	.13	.09
12-0-12	5,965	7,832	.04	.06
12-6-6	5,683	7,150	.04	.05
12-12-12	306,858	500,839	2.04	3.44
12-24-12	27,327	26,762	.18	.19
12-36-12	1,750	4,729	.01	.03
12-24-0	8,272	4,597	.06	.03
13-13-13	31,459	38,058	.20	.26
14-0-7	0	11,641	0	.08
14-0-14	46,804	47,436	.31	.33
14-14-14	33,782	43,913	.23	.30
15-0-12	3,549	3,181	.02	.02
15-0-15	4,043	4,902	.03	.04
15-8-4	6,731	7,815	.04	.05
15-15-0	55,637	31,462	.37	.22
15-30-0	2,958	4,174	.02	.03
16-8-8	3,313	3,052	.02	.02
16-10-0	7,775	4,996	.06	.03
16-48-0	236	5,092	[2]	.04
17-7-0	17,813	16,192	.12	.11
20-0-20	7,399	6,417	.05	.04
171 Listed Grades	14,504,643	13,973,318	96.26	96.17
Other Grades Reported	435,397[3]	358,045[4]	2.88	2.46
Not Reported by Grade	128,147	197,796	0.86	1.37
Total	15,068,187[5]	14,529,159[5]	100.00	100.00

[1] Grades consumed in amounts of 3,000 tons or more in year ended June 30, 1956 and their consumption in year ended June 30, 1955.

[2] Less than 0.005 percent.

[3] 1,171 grades.

[4] 1,231 grades.

[5] Does not include the quantity of mixtures consumed in the Territories.

Table 3—Consumption of Mixed Fertilizers, by Grades in Each State and Region, Year Ended June 30, 1956

State	Fifteen Principal Grades Consumed in Region — Tons														All Other Grades		Total Tons
															Number[1]	Tons[2]	
New England																	
	8-12-12	5-10-10	6-9-12	10-10-10	8-16-16	8-12-16	0-20-20	6-3-6	5-8-7	8-9-10	7-7-7	10-15-15	0-15-30	6-10-4	5-10-5			
Maine	51,077	12,795	36,886	11,243	12,150	16,071	745	0	2,134	8,164	475	6,048	93	303	224	40	19,607	178,015
New Hampshire	585	2,528	0	1,450	3,436	0	383	15	666	0	498	0	1,015	542	102	27	955	12,175
Vermont	187	6,127	0	3,434	5,917	0	12,293	0	129	0	394	0	2,064	70	187	26	1,754	32,556
Massachusetts	847	14,057	0	7,302	4,450	0	596	4,536	4,518	0	3,344	0	960	2,875	2,199	33	12,824	58,508
Rhode Island	258	7,111	0	585	185	0	271	0	521	0	594	0	153	442	195	25	2,806	13,121
Connecticut	1,203	10,092	0	5,614	2,200	0	1,246	8,025	2,244	0	2,165	0	1,695	1,565	2,065	61	15,081	53,195
Total	54,157	52,710	36,886	29,628	28,338	16,071	15,534	12,576	10,212	8,164	7,470	6,048	5,980	5,797	4,972	93	53,027	347,570
Middle Atlantic																		
	5-10-10	5-10-5	10-10-10	3-12-6	8-16-16	0-20-20	6-12-6	2-12-12	4-8-12	6-12-12	3-12-12	4-12-12	0-14-14	8-8-8	5-10-15			
New York	153,338	114,040	60,489	6,821	34,928	14,771	31,912	35	4,035	12,703	3,006	7	2,292	4,116	6,916	71	43,108	492,517
New Jersey	124,253	24,109	8,075	1,517	1,484	2,416	1,783	15	325	3,539	1,685	531	2,362	13,562	1,763	70	51,744	239,163
Pennsylvania	262,587	22,268	57,483	71,519	24,578	29,453	2,145	6,761	8,176	7,811	11,248	18,359	5,955	1,173	2,423	106	53,298	585,237
Delaware	38,521	1,299	6,663	1,230	3,592	1,817	0	4,937	1,081	1,576	1,791	1,233	2,951	263	5,936	60	7,761	80,651
Dist. of Columbia	36	644	19	0	0	0	0	0	4	4	0	0	0	106	0	17	962	1,775
Maryland	88,827	24,031	15,587	36,861	4,163	5,359	6	16,261	14,931	1,720	9,680	5,118	5,520	1,676	1,611	86	34,305	265,656
West Virginia	33,143	2,688	3,122	11,916	256	5,492	0	2,990	1	563	279	151	2,849	13	82	46	11,340	74,885
Total	700,705	189,079	151,438	129,864	69,001	59,308	35,846	30,999	28,553	27,916	27,689	25,399	21,929	20,909	18,731	175	202,518	1,739,884
South Atlantic																		
	4-12-12	3-9-9	5-10-10	4-10-6	2-12-12	3-9-6	4-8-8	4-8-6	5-10-5	4-7-5	4-8-10	0-14-14	3-12-12	6-8-6	6-6-6			
Virginia	9,579	42,610	133,775	98	193,709	41,071	2	0	64,355	0	7,170	30,586	41	11,234	0	52	138,333	672,563
North Carolina	8,741	205,594	208,464	231,254	147,158	223,851	0	0	16,252	0	68,923	10,374	0	49,922	0	22	180,621	1,351,154
South Carolina	27,267	146,667	18,144	136,606	0	25,626	17,598	0	48,483	0	0	41,155	80,028	2,842	0	23	70,787	615,203
Georgia	514,071	74,563	7,624	47	19,668	1,502	111,203	149,744	4,845	95	0	2,659	2,187	15,199	0	97	95,687	999,114
Florida	24,073	7,329	4,642	774	4,751	0	77,299	40,442	6,934	115,153	38,672	6,510	5,177	7,647	84,966	837	777,092	1,201,461
Total	583,751	476,763	372,649	368,779	365,286	292,050	206,102	190,186	140,869	115,248	114,765	91,284	87,433	86,844	84,966	913	1,262,520	4,839,495
East North Central																		
	3-12-12	4-16-16	5-20-20	10-10-10	12-12-12	0-20-20	5-10-10	3-9-27	3-18-9	0-10-30	6-12-12	3-9-18	6-24-24	8-16-16	6-10-4			
Ohio	413,840	57,645	109,253	71,772	58,478	31,066	108,560	1,145	14,730	1,989	15,072	6,990	2,041	17,070	7,449	87	68,217	985,317
Indiana	171,610	252,650	143,898	98,771	76,252	44,089	3,236	23,720	5,317	10,950	5,015	2,620	9,055	2,925	3,187	103	67,668	921,003
Illinois	97,665	102,175	52,871	84,229	44,954	18,944	243	29,577	718	3,222	5,262	2,266	7,165	373	3,433	96	61,840	514,937
Michigan	136,789	104,209	102,244	40,140	77,061	17,929	4,186	3,302	19,912	3,266	8,630	3,618	864	1,200	6,837	81	48,544	578,731
Wisconsin	69,704	51,280	94,607	30,304	5,509	34,255	0	18,318	957	18,813	3,937	11,704	5,808	2,226	0	57	32,439	379,861
Total	889,608	567,959	502,873	325,216	262,254	146,283	116,225	76,062	41,634	38,280	37,916	27,198	24,933	23,794	20,906	179	278,708	3,379,849
West North Central																		
	12-12-12	5-20-20	6-24-12	3-12-12	8-24-8	10-10-10	0-20-20	5-20-10	8-32-0	4-12-4	4-16-16	10-20-0	8-8-8	15-15-0	8-16-16			
Minnesota	3,627	71,656	62,070	1,965	0	10,852	23,670	7,940	9,110	0	22,757	1,759	39	251	14,909	74	58,718	289,323
Iowa	20,422	89,648	4,366	12,712	601	28,723	9,623	40,890	13,277	64	9,737	14,112	331	7,028	1,119	204	53,190	305,843
Missouri	152,590	12,936	0	53,337	44,884	19,631	16,123	5	0	36,178	6,425	3,709	31,513	3,002	0	28	74,525	454,768
North Dakota	247	500	3,398	103	5	276	47	136	8,556	0	233	84	0	180	571	51	9,522	23,858
South Dakota	102	17	336	13	33	102	45	13	3,105	1	1	2,210	0	1,215	20	46	2,208	9,421
Nebraska	206	100	48	0	166	162	426	102	3,960	32	0	3,374	10	3,269	0	71	8,655	20,510
Kansas	3,848	606	7	833	21,208	964	633	0	3,213	4,450	117	13,655	476	8,003	68	56	19,971	78,074
Total	180,952	175,463	70,225	68,963	66,897	60,710	50,569	49,086	41,221	40,725	39,270	38,903	32,389	22,948	16,687	257	226,789	1,181,797
East South Central																		
	4-10-7	6-12-12	6-8-8	4-12-12	5-10-5	6-8-4	5-10-15	4-12-8	3-9-6	3-12-12	0-14-14	0-16-8	5-10-10	6-8-6	10-10-10			
Kentucky	0	17,753	41	159	1,907	0	84,569	84,951	17,409	50,449	917	0	21,579	30,833	22,766	71	98,921	432,254
Tennessee	1,524	218,712	2,941	2,103	3,973	1,394	12,134	7,322	58,041	16,442	248	0	8,266	883	3,734	99	72,484	410,208
Alabama	414,558	156	42,518	124,894	1,838	94,786	0	0	2	0	50,526	40,006	22	28	404	36	36,085	805,823
Mississippi	4,719	1,856	167,963	17	99,361	3,586	0	0	0	2,084	5,482	625	8,686	77	695	38	37,265	332,416
Total	420,801	238,477	213,463	127,173	107,079	99,766	96,703	92,273	75,452	68,982	57,173	40,631	38,553	31,821	27,599	143	244,755	1,980,701
West South Central																		
	5-10-5	10-20-10	8-8-8	12-12-12	3-12-12	4-12-4	6-8-12	12-24-12	10-20-0	13-13-13	6-8-8	5-20-20	3-9-18	5-10-10	0-20-20			
Arkansas	46,917	22,013	3,014	11,770	1,815	1,116	22,583	1,430	158	3,547	52	1,456	10,955	1,618	8,343	60	38,444	175,231
Louisiana	25,592	4,106	32,627	18,699	22,555	9,928	711	1,783	1	3,243	12,241	8,044	16	3,156	2,031	43	18,791	163,524
Oklahoma	27,355	17,542	479	365	545	4,703	0	2,934	7,096	331	0	346	1,050	2,147	61	45	11,578	76,532
Texas	118,239	53,698	15,524	3,787	3,221	7,896	170	12,599	11,286	6,138	113	2,194	11	4,326	293	88	48,307	287,802
Total	218,103	97,359	51,644	34,621	28,136	23,643	23,464	18,746	18,541	13,259	12,406	12,040	12,032	11,247	10,728	146	117,120	703,089
Mountain																		
	10-20-0	6-10-4	10-16-8	20-20-0	10-20-5	10-10-10	27-14-0	10-10-0	10-20-10	20-10-0	10-18-5	6-30-0	15-11-0	12-24-0	18-9-0			
Montana	2,126	199	0	0	0	0	80	0	8	0	204	615	0	0	0	21	505	3,737
Idaho	478	142	854	0	0	44	605	40	0	2	458	218	1,020	9	0	31	1,512	5,382
Wyoming	488	44	0	0	0	0	0	0	16	0	209	12	0	132	0	16	938	1,839
Colorado	479	834	1,603	48	0	525	0	0	265	76	386	205	0	836	0	70	6,714	12,041
New Mexico	135	0	0	639	0	76	0	15	102	0	0	0	0	0	0	18	864	1,831
Arizona	2,556	0	0	1,713	2,152	1,049	861	1,441	1,104	1,360	0	0	0	0	827	39	4,410	17,473
Utah	361	2,251	31	0	0	17	189	0	0	0	139	74	0	0	0	34	1,464	4,526
Nevada	67	725	0	0	0	55	40	0	0	0	0	0	0	0	0	9	160	1,047
Total	6,690	4,195	2,488	2,400	2,152	1,836	1,775	1,496	1,495	1,438	1,396	1,124	1,020	977	827	139	16,557	47,876
Pacific																		
	10-10-10	10-10-5	17-7-0	6-10-4	8-8-4	8-10-12	15-8-4	10-16-8	4-4-2	16-10-0	11-8-4	6-20-20	4-10-10	10-10-0	6-9-6			
Washington	830	157	0	3,026	0	0	0	231	0	0	0	1,642	0	19	0	77	30,049	35,954
Oregon	837	121	0	4,109	0	5	8	5,555	0	0	0	2,857	0	0	0	58	12,958	26,450
California	20,537	19,460	15,903	7,305	14,214	8,438	7,807	0	5,015	4,992	4,891	0	4,379	4,345	4,086	23	125,122	246,494
Total	22,204	19,738	15,903	14,440	14,214	8,443	7,815	5,786	5,015	4,992	4,891	4,499	4,379	4,364	4,086	108	168,129	308,898
Territories[4]																		
	14-4-10	15-4-7	14-2-8	10-10-8	6-8-10	8-6-10	12-6-10	12-4-10	12-3-16	13-3-12	9-10-5	12-2-10	12-10-5	16-4-5	10-6-14			
Puerto Rico	33,685	16,577	15,775	14,868	12,365	10,626	9,736	8,951	7,658	7,123	4,322	3,891	3,700	3,686	3,371	25	24,775	181,109
Continental United States																		
	5-10-10	3-12-12	4-12-12	5-20-20	5-10-5	10-10-10	4-16-16	12-12-12	3-9-9	4-10-7	2-12-12	4-10-6	3-9-6	6-12-12	0-20-20			
New England	52,710	653	0	0	4,972	29,628	0	2,000	0	0	54	0	0	1,999	15,534	100	240,020	347,570
Middle Atlantic	700,705	27,689	25,399	344	189,079	151,438	844	4,809	100	0	30,999	0	15	27,916	59,308	177	521,239	1,739,884
South Atlantic	372,649	87,433	583,751	647	140,869	34,808	56	5,121	476,763	48,742	365,286	368,779	292,050	12,324	5,271	913	2,044,946	4,839,495
East North Central	116,225	889,608	614	502,873	10,362	325,216	567,959	262,254	239	0	6	0	0	37,916	146,283	182	520,294	3,379,849
West North Central	1,191	68,963	146	175,463	6,928	60,710	39,270	180,952	0	0	0	0	0	14,090	50,569	264	583,515	1,181,797
East South Central	38,553	68,982	127,173	7,759	107,079	27,599	7,464	11,076	1,039	420,801	4,466	0	75,452	238,477	21,853	144	822,928	1,980,701
West South Central	11,247	28,136	132	12,040	218,103	5,651	3	34,621	12	0	0	0	0	1,770	10,728	150	380,646	703,089
Mountain	5	0	0	0	590	1,836	0	6	0	0	0	0	0	0	219	149	45,220	47,876
Pacific	3,627	15	0	385	101	22,204	0	0	10	0	0	18	0	103	510	114	281,925	308,898
Total	1,296,912	1,171,479	737,215	699,511	678,083	659,090	615,596	500,839	478,163	469,543	400,811	368,797	367,517	334,595	310,275	1,387	5,440,733	14,529,139

[1] Exclusive of mixtures not reported by grade.
[2] Including the tonnage of mixtures not reported by grade.
[3] Total number of mixtures ranges over 500 but only 15 reported by grade.
[4] Total consumption in Hawaii was 65,385 tons of mixed fertilizers, comprising 130 grades, which were manufactured to consumer specifications. Data for Alaska not available. Estimated less than 500 tons.

Table 4—Fertilizer Materials Consumed for Direct application, by States, Year Ended June 30, 1956[1] (in Tons)

State and Region	Chemical Nitrogen Materials									Natural Organics[2]	Phosphate Materials[2]				Potash Materials		Total Primary Nutrient Materials	Secondary and Trace Nutrient Materials[2]
	Ammonia (Anhydrous)	Ammonium Nitrate	Ammonium Nitrate-Limestone Mixtures	Ammonium Sulfate	Calcium Cyanamide	Nitrogen Solutions & Aqua Ammonia[2]	Sodium Nitrate	Urea	Other[2]		Phosphate Rock[3]	Superphosphates: Grades 22 Percent and Under	Superphosphates: Grades Over 22 Percent	Other	Chlorides 50-60 Percent Grades	Other[2]		
Maine	0	1,036	38	78	227	50	122	147	5	708	4	2,635	2	228	44	14	5,338	14
New Hampshire	0	590	11	2	79	1	76	23	2	653	2	2,520	0	72	87	31	4,149	3
Vermont	0	457	48	3	12	0	62	153	2	145	98	16,827	5	31	264	12	18,119	24
Massachusetts	0	1,012	34	146	273	0	741	130	46	8,811	202	3,053	0	635	496	97	15,676	90
Rhode Island	0	103	4	0	267	0	56	14	5	929	6	278	0	54	59	2	1,777	8
Connecticut	3	718	36	22	346	4	694	108	22	12,089	54	6,087	73	1,435	761	861	23,313	176
New England	3	3,916	171	251	1,204	55	1,751	575	82	23,335	366	31,400	80	2,455	1,711	1,017	68,372	315
New York	241	11,653	611	312	3,498	676	4,043	778	235	18,347	919	36,396	400	1,070	758	740	80,677	731
New Jersey	261	1,897	457	75	1,584	490	2,104	546	252	7,791	647	4,102	18	1,968	578	172	22,942	198
Pennsylvania	577	5,338	958	2,143	1,733	1,446	1,592	896	265	9,375	4,552	32,494	240	1,994	807	496	64,906	2,418
Delaware	194	1,183	29	1	614	587	155	82	0	541	170	454	140	72	436	0	4,658	68
Dist. of Columbia	0	7	0	0	2	0	22	20	0	651	0	7	0	57	0	0	766	0
Maryland	406	1,191	593	67	1,430	918	1,482	449	12	1,607	1,643	3,520	7	524	410	1,176	15,435	310
West Virginia	0	855	287	294	10	21	1,686	78	0	378	132	5,794	290	91	80	0	9,996	8
Middle Atlantic	1,679	22,124	2,935	2,892	8,871	4,138	11,084	2,849	764	38,690	8,063	82,767	1,095	5,776	3,069	2,584	199,380	3,733
Virgina	839	5,142	22,936	1,238	1,966	4,073	21,828	383	1	951	1,333	7,014	166	1,588	2,870	16,493	88,821	16,480
North Carolina	6,454	12,658	106,208	218	6,837	12,902	109,298	1,362	0	3,914	3,442	14,577	67	6,181	10,177	10,533	304,828	45,436
South Carolina	826	18,963	82,272	420	1,206	5,711	87,514	495	0	680	976	13,017	0	5,912	17,841	9,075	244,908	3,979
Georgia	7,582	46,300	47,088	2,431	1,978	1,944	79,734	269	141	2,124	287	39,059	186	7,471	6,822	2,849	246,265	25,677
Florida	1,087	13,357	5,944	2,534	1,652	2,728	22,526	2,812	11,556	11,003	22,425	8,751	211	5,727	2,519	17,744	132,576	4,942
South Atlantic	16,788	96,420	264,448	6,841	13,639	27,358	320,900	5,321	11,698	18,672	28,463	82,418	630	26,879	40,229	56,694	1,017,398	96,514
Ohio	2,241	12,699	380	8,731	1,110	2,418	832	1,676	32	7,151	6,081	12,613	2,392	2,167	3,249	857	64,629	185
Indiana	11,002	35,665	158	3,660	924	6,306	232	6,591	20	3,057	15,677	5,804	11,364	2,528	39,254	510	142,752	228
Illinois	18,570	45,989	1,260	27,211	994	8,672	13	5,250	21	12,040	570,294	40,589	27,114	10,397	76,301	60	844,775	746
Michigan	1,767	9,737	87	5,181	181	1,164	346	2,153	66	12,640	1,998	8,845	1,009	906	1,501	693	48,274	993
Wisconsin	3,346	5,836	0	239	22	1,071	0	234	2	6,078	4,860	1,997	822	717	6,470	626	32,320	93
East North Central	36,926	109,926	1,885	45,022	3,231	19,631	1,423	15,904	141	40,966	598,910	69,848	42,701	16,715	126,775	2,746	1,132,750	2,245
Minnesota	13,694	6,811	0	449	85	5,506	0	526	35	4,084	1,062	4,378	25,834	10,238	3,718	211	76,631	2,154
Iowa	10,523	27,922	0	444	45	6,259	0	1,946	3	4,167	9,141	33,159	20,507	20,061	9,075	99	143,351	112
Missouri	15,538	57,181	0	948	40	4,369	18	746	5	3,761	236,112	3,422	6,357	7,470	19,297	363	355,627	14
North Dakota	102	947	0	20	0	64	0	42	0	64	40	30	17,598	26,380	22	0	45,309	1
South Dakota	1,618	2,455	0	7	0	319	0	394	0	306	130	571	4,912	6,436	31	0	17,179	0
Nebraska	36,153	30,013	173	312	0	11,789	0	2,667	0	772	266	2,492	17,994	9,521	264	0	112,416	64
Kansas	8,240	38,426	0	617	1	636	4	356	2	853	1,511	5,459	34,376	37,426	1,730	0	129,637	33
West North Central	85,868	163,755	173	2,797	171	28,942	22	6,677	45	14,007	248,262	49,511	127,578	117,532	34,137	673	880,150	2,378
Kentucky	1,641	29,387	111	485	1,409	474	1,467	162	7	530	15,391	24,156	2,516	9,326	9,303	6,395	102,762	119
Tennessee	12,031	35,762	480	898	1,080	0	16,254	33	4	1,359	1,735	10,525	4,967	7,758	11,563	1,253	105,702	229
Alabama	2,937	79,130	35,178	2,074	737	734	85,655	179	3	523	3,249	21,415	373	50,022	9,473	49	291,731	1,340
Mississippi	45,068	139,402	7,723	1,749	11,634	588	52,822	868	0	64	4,586	32,760	2,315	94,470	22,900	845	417,794	12
East South Central	61,677	283,681	43,492	5,206	14,860	1,796	156,198	1,242	14	2,476	24,961	88,856	10,171	161,578	53,239	8,542	917,989	1,700
Arkansas	23,038	63,607	38	4,123	10,743	727	23,839	6,452	1	56	671	7,977	9,645	4,213	32,603	354	188,087	1
Louisiana	25,510	35,921	529	9,304	2,015	2,819	24,110	1,223	218	231	6,295	16,027	2,962	5,961	6,043	738	139,906	55
Oklahoma	1,621	5,693	60	971	0	0	354	278	1	1,338	3,522	28,130	6,620	9,398	889	86	58,961	11
Texas	41,589	22,288	0	43,095	2,796	6,526	1,865	5,286	406	7,502	6,310	47,424	27,956	62,108	971	91	276,213	2,488
West South Central	91,758	127,509	627	57,493	15,554	10,072	50,168	13,239	626	9,127	16,798	99,558	47,183	81,680	40,506	1,269	663,167	2,555
Montana	1,088	2,910	0	2,699	0	102	0	221	0	156	0	90	16,078	4,636	62	0	28,042	1,189
Idaho	4,492	6,949	0	9,691	139	3,516	30	485	96	209	0	3,002	16,146	7,949	129	0	52,833	6,204
Wyoming	0	842	0	422	0	34	0	362	0	1	0	25	5,285	1,481	27	0	8,479	661
Colorado	2,614	10,390	197	3,691	12	785	0	1,384	0	1,426	0	793	13,826	5,481	430	294	41,323	186
New Mexico	4,520	1,174	0	862	0	0	0	1,674	40	1,117	0	5,611	8,048	4,049	64	0	27,159	0
Arizona	14,427	8,063	0	23,174	819	10,993	704	10,604	9,541	8,979	0	5,174	3,395	28,419	182	1,054	125,528	10,563
Utah	1,821	6,138	0	5,781	0	22	0	564	5	968	0	1,944	5,569	3,379	30	0	26,221	237
Nevada	14	48	0	632	0	116	0	27	0	231	0	40	297	733	0	0	2,138	1,097
Mountain	28,976	36,514	197	46,952	970	15,568	734	15,321	9,682	13,087	0	16,679	68,644	56,127	924	1,348	311,723	20,137
Washington	19,013	22,019	0	12,373	243	28,753	97	1,372	2,191	4,654	416	5,868	7,565	14,132	2,485	289	121,470	12,415
Oregon	5,353	22,582	0	38,666	837	12,467	0	2,631	3,548	761	37	10,573	843	26,311	2,730	193	127,532	15,961
California	68,412	52,179	0	140,934	6,238	216,857	185	18,704	35,811	306,882[4]	1,750	64,215	17,569	101,486	1,896	5,295	1,038,413	628,696
Pacific	92,778	96,780	0	191,973	7,318	258,077	282	22,707	41,550	312,297	2,203	80,656	25,977	141,929	7,111	5,777	1,287,415	657,072
Continental U. S.	416,453	940,625	313,928	359,427	65,818	365,637	542,562	83,835	64,602	472,657	928,026	601,693	324,059	610,671	307,701	80,650	6,478,344	786,649
Hawaii	0	41	0	11,397	0	50,294	233	8,236	66	49	2,888	3,899	1,599	2,762	14,604	1,675	97,743	2,956
Puerto Rico	2,001	0	0	43,574	0	2,912	9	302	0	0	0	1,434	65	1,219	106	103	51,725	0
Alaska[5]	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Territories	2,001	41	0	54,971	0	53,206	242	8,538	66	49	2,888	5,333	1,664	3,981	14,710	1,778	149,468	2,956
Total: 1955-56	418,454	940,666	313,928	414,398	65,818	418,843	542,804	92,373	64,668	472,706	930,914	607,026	325,723	614,652	322,411	82,428	6,627,812	789,605
Total: 1954-55	353,681	1,115,358	358,023	519,968	68,882	340,574	615,842	68,585	59,254	461,100	604,653	685,722	341,940	592,340[6]	318,657	82,427	6,587,006[6]	791,606[7]
Total: 1953-54	350,474	924,736	390,603	536,716	68,213	191,592	653,105	[8]	144,964	420,068	912,676	786,927	247,142	598,141	309,735	81,818	6,616,910	615,513

[1] Includes fertilizer distributed by Government agencies. Excludes lime and the quantities of materials used for manufacture of commercial mixtures.

[2] The principal fertilizers are shown separately in Table 5, by regions.

[3] Includes colloidal phosphate the quantity of which is shown separately in Table 5, by regions.

[4] Includes an estimated 245,000 tons of dried manures.

[5] Not available, estimated less than 1,000 tons.

[6] Revised—8,541 tons of basic slag was deleted from the Pennsylvania total.

[7] Revised—11,298 tons of calcium sulfate (gypsum) was added to the North Carolina total.

[8] Withheld to avoid disclosing figures for individual establishments.

Table 5—Kinds of Fertilizers Consumed in Regions of the United States, Year Ended June 30, 1956[1] (in Tons)

Kind	New England	Middle Atlantic	South Atlantic	East North Central	West North Central	East South Central	West South Central	Mountain	Pacific	Territories[2]	Total
MIXTURES: N-P-K	322,845	1,639,449	4,434,561	3,120,385	960,485	1,823,795	635,688	23,462	248,214	208,360	13,417,244
N-P	81	281	2,323	24,494	135,278	1,761	40,769	24,094	55,039	5,217	289,337
P-K	24,644	99,982	216,067	234,961	86,006	153,070	25,828	272	2,402	3,187	846,419
N-K	0	172	186,544	9	28	2,075	804	48	3,243	29,730	222,653
CHEMICAL NITROGEN MATERIALS											
Ammonia, anhydrous	3	1,679	16,788	36,926	85,868	61,677	91,758	28,976	92,778	2,001	418,454[3]
Ammonia, aqua: 20-26% N	0	21	200	2,870	1,140	0	2,819	9,865	239,827	53,206	309,948[4]
Ammonium nitrate	3,916	22,124	96,420	109,926	163,755	283,681	127,509	36,514	96,780	41	940,666
Ammonium nitrate-limestone mixtures	171	2,935	264,448	1,885	173	43,492	627	197	0	0	313,928
Ammonium sulfate	251	2,892	6,841	45,022	2,797	5,206	57,493	46,952	191,973	54,971	414,398
Calcium cyanamid	1,204	8,871	13,639	3,231	171	14,860	15,554	970	7,318	0	65,818
Calcium nitrate	0	5	10,492	0	0	0	396	9,637	34,989	66	55,585
Nitrogen solutions: 20-41% N	55	4,117	27,158	16,761	27,802	1,796	7,253	5,703	18,250	0	108,895[5]
Sodium nitrate	1,751	11,084	320,900	1,423	22	156,198	50,168	734	282	242	542,804
Urea	575	2,849	5,321	15,904	6,677	1,242	13,239	15,321	22,707	8,538	92,373
Other	82	759	1,206	141	45	14	230	45	6,561	0	9,083[6]
NATURAL ORGANIC MATERIALS											
Blood, dried	20	173	44	0	0	1	0	19	2,547	0	2,804
Castor pomace	2,456	95	1,688	0	0	0	0	0	937	0	5,176
Compost[7]	0	136	3	4,979	585	95	2,579	200	0	0	8,577
Cottonseed meal[7]	7,143	44	2,207	0	0	16	0	0	1	0	9,411
Fish scrap, meal, emulsions	505	0	26	0	0	0	0	0	1,685	0	2,216
Manures, dried	4,379	16,972	2,774	6,107	2,206	1,067	3,122	1,480	247,559	9	285,675
Sewage sludge, activated	5,472	12,865	7,160	29,027	11,108	1,277	3,426	10,689	20,102	40	101,166
Sewage sludge, other	0	0	0	556	103	0	0	209	34,983	0	35,851
Tankage, animal	0	223	196	0	0	0	0	0	1,326	0	1,745
Tankage, process	2,774	8,182	3,598	297	5	4	0	490	300	0	15,650
Other	586	0	976	0	0	16	0	0	2,857	0	4,435[8]
PHOSPHATE MATERIALS											
Ammonium phosphate: 11-48[9]	0	7	0	3,747	20,974	0	2,241	3,351	14,399	2,409	47,128
Ammonium phosphate: 11-50[9]	0	0	0	0	1,113	0	50	483	0	0	1,646
Ammonium phosphate: 13-39[9]	0	0	0	494	16,567	0	13,649	5,006	6,411	0	42,127
Ammonium phosphate sulfate: 16-20[9]	0	0	0	402	58,666	210	56,130	36,402	99,503	233	251,546
Ammonium phosphate nitrate: 27-14[9]	0	0	0	0	606	0	0	[10]	5,246	0	5,852
Ammoniated superphosphate[11]	0	0	264	0	0	0	44	0	5,672	1,219	7,199
Basic lime phosphate	0	0	693	0	0	5	0	0	0	0	698
Basic slag	0	48	21,974	0	0	146,543	3,300	0	0	0	171,865[20]
Bonemeal, raw	32	359	289	336	178	22	396	40	1,016	0	2,668
Bonemeal, steamed	1,472	4,972	878	1,463	21	297	184	0	1,454	0	10,741
Calcium metaphosphate	0	299	2,398	9,058	15,426	13,207	2,550	188	0	0	43,126
Diammonium phosphate: 21-53[9]	150	91	203	1,215	3,946	1,294	2,428	4,127	280	120	13,854
Phosphoric acid: 36-54% P_2O_5	0	0	0	0	35	0	708	6,530	7,948	0	15,221[12]
Phosphate rock	366	8,023	27,863	595,671	245,504	16,510	15,297	0	1,787	2,888	913,909
Colloidal phosphate	0	40	600	3,239	2,758	8,451	1,501	0	416	0	17,005
Precipitated bone	801	0	0	0	0	0	0	0	0	0	801
Superphosphate: 18%	3,743	11,662	22,348	23,379	17,604	19,139	0	518	832	0	99,225
Superphosphate: 19%	180	24	1,823	0	97	22	0	6,707	72,897	0	81,750
Superphosphate: 20-22%	27,477	71,081	58,247	46,469	31,810	69,695	99,558	9,454	6,927	5,333	426,051
Superphosphate: 23-41%	0	8	0	1,644	291	0	4,636	1,159	0	0	7,738
Superphosphate: 42-44%	0	0	0	0	26,170	0	35	35,296	10,365	0	71,866
Superphosphate: 45%	73	737	39	31,123	66,256	1,565	38,117	16,706	1,829	19	156,464
Superphosphate: 46%	0	251	9	7,481	25,190	4,373	1,864	15,483	13,666	1,645	69,962
Superphosphate: 47%	0	90	88	1,132	3,680	294	326	0	0	0	5,610
Superphosphate: 48%	7	9	449	901	5,430	2,787	1,016	0	117	0	10,716
Superphosphate: 49-50%	0	0	45	420	561	1,152	1,189	0	0	0	3,367
Other	0	0	180	0	0	0	0	0	0	0	180[13]
POTASH MATERIALS											
Cotton hull ashes	632	2	311	0	0	0	0	0	0	0	945
Lime-potash mixtures[14]	0	1,093	22,359	0	0	0	0	0	0	0	23,452[15]
Manure salts: 20-30% K_2O	0	10	717	25	0	0	220	0	0	0	972
Potassium chloride: 48-52% K_2O	2	224	5,508	1,328	1,170	1,321	2,432	10	1,186	0	13,181
Potassium chloride: 58-62% K_2O	1,709	2,845	34,721	125,447	32,967	51,918	38,074	914	5,925	14,710	309,230
Potassium magnesium sulfate	116	598	2,109	1,620	466	1,469	101	0	208	1	6,688
Potassium sodium nitrate[11]	90	1	19,700	8	0	32	849	0	0	0	20,680
Potassium sulfate	179	874	7,187	1,092	207	7,041	99	1,348	5,493	1,777	25,297
Other	0	6	4,311	1	0	0	0	0	76	0	4,394[16]
PRIMARY NUTRIENT FERTILIZERS	415,942	1,939,264	5,856,893	4,512,599	2,061,947	2,898,690	1,366,256	359,599	1,596,313	395,962	21,403,465
SECONDARY & TRACE NUTRIENT MATERIALS											
Aluminum sulfate[7]	8	10	2	0	0	0	0	0	86	0	106
Borax[7]	63	248	746	164	42	384	22	0	388	0	2,057
Calcium sulfate (gypsum)	143	2,886	92,553	1,058	2,260	1,288	24	16,927	621,360	0	738,499[20]
Copper sulfate[7]	0	36	382	55	15	0	0	5	133	0	626
Ferrous sulfate[7]	0	0	42	0	0	0	0	344	4,849[17]	2,842	8,077
Magnesium sulfate[7]	89	316	1,983	20	5	0	0	0	109	22	2,544
Manganese sulfate[7]	0	143	259	901[18]	2	0	30	1	52	0	1,388
Mixed minerals[7]	2	0	4	8	0	5	3	302	3,650	0	3,974
Sulfur: 25-99% S	10	70	402	38	49	1	2,034	2,536	20,001	0	25,141
Sulfuric acid: 40-93%	0	0	0	0	0	0	434	18	4,456	0	4,908
Zinc sulfate[7]	0	24	141	1	5	22	8	4	1,988[19]	92	2,285
SECONDARY & TRACE NUTRIENT MATERIALS	315	3,733	96,514	2,245	2,378	1,700	2,555	20,137	657,072	2,956	789,605
ALL FERTILIZERS	416,257	1,942,997	5,953,407	4,514,844	2,064,325	2,900,390	1,368,811	379,736	2,253,385	398,918	22,193,070

[1] Includes distribution by Government agencies. Does not include the quantities of materials used for the manufacture of the indicated quantities of commercial mixtures.

[2] Hawaii and Puerto Rico.

[3] 343,578 tons N.

[4] 62,510 tons N.

[5] 34,493 tons N.

[6] 1,769 tons N.

[7] Distributed by manufacturers of fertilizers.

[8] Average: 4.07-2.14-0.66.

[9] Includes quantities reported as mixtures.

[10] All quantities totaling 1,775 tons was, by error, left in mixtures. Their State totals are listed in Table 3.

[11] Additional quantities may have been reported as mixtures.

[12] 7,515 tons P_2O_5.

[13] 29 tons available P_2O_5.

[14] Additional quantities are given free to farmers for which no records are kept.

[15] 1,418 tons K_2O.

[16] Average 0.55-1.21-6.78.

[17] Includes 1,239 tons of ferrous oxide.

[18] Includes 71 tons of manganese oxide.

[19] Includes 109 tons of zinc oxide.

[20] Revised total for year ended June 30, 1955; basic slag, 150,983 tons; calcium sulfate, 752,414 tons.

increases in 38 and decreases in 13; for available P_2O_5, increases or no change in 42 and decreases in 9; for K_2O, increases in 41 and decreases in 10; and for all these nutrients, increases in 44 and decreases in 7. The West South Central region was the only area which, in each of the political units the average content of each of the nutrients showed an increase.

The national weighted average of the primary nutrients contained in mixed fertilizers in 1955-56 was for nitrogen, 5.39 percent; for available P_2O_5, 12.08 percent; for K_2O, 11.20 percent; and for the total of these nutrients 28.67 percent. The corresponding values in the preceding year were 5.24, 11.86, 10.80, and 27.90 percent. The proportionate increase was highest for K_2O and lowest for P_2O_5.

MATERIALS

In 1955-56 the consumption of fertilizer materials for direct application amounted to 7,417,417 tons as compared with 7,378,612 tons in 1954-55 (table 1). Fertilizer materials in 1955-56 comprised chemical nitrogen materials, 3,271,952 tons; natural organic materials, 472,706 tons; phosphate materials (including ammonium phosphates, ammonium phosphate-sulfate, and ammonium phosphate-nitrate), 2,478,315 tons; potash materials (including potassium nitrate, potassium-sodium nitrate, and lime-potash), 404,839 tons; and secondary and trace nutrient materials, 789,605 tons. Compared with the previous year, there was an increase of 11,606 tons in natural organic materials, 253,660 tons in phosphate materials, and 3,755 tons in potash materials. Chemical nitrogen materials and secondary and trace nutrient materials decreased 228,215 tons and 2,001 tons, respectively. The consumption of the principal materials comprising these classes is shown by States and regions in tables 4 and 5.

Compared with the previous year, the principal changes in consumption of the chemical nitrogen materials in 1955-56 were increases in the tonnages of urea (35 percent), aqua ammonia (34 percent), and anhydrous ammonia (18 percent). The largest increases in the tonnages of urea were in the East North Central, West South Central, Mountain, and Pacific regions, which together accounted for 73 percent of the consumption of this material in 1955-56. Most of the increase in consumption of aqua ammonia was in the Pacific region where 77 percent of the total tonnage was used. Increases in the consumption of anhydrous ammonia were mostly in the South Central and Pacific regions — 53,123 tons, 27.5 percent.

Decreases in the consumption of chemical nitrogen materials comprised chiefly sodium nitrate (73,038 tons, 12 percent), ammonium nitrate-limestone mixtures (44,095 tons, 12 percent), ammonium nitrate (174,692 tons, 16 percent), and ammonium sulfate (105,570 tons, 20 percent).

Phosphate rock was the only phosphate material that showed a large increase in consumption (330,812 tons, 57 percent), nearly all of which was in Illinois and Missouri the States using more than 85 percent of the total tonnage of this material in 1955-56. The other increases in phosphate materials were chiefly in basic slag (20,882 tons) and the total for all kinds of ammonium phosphate products (23,011 tons). Decreases in the consumption of superphosphates containing 22 percent or less of available P_2O_5 occurred in all the regions and totaled 78,696 tons (11 percent). The decrease of 16,217 tons (5 percent) in the consumption of superphosphates containing more than 22 percent P_2O_5 was spread over 5 of the 10 regions. No consumption of fused tricalcium phosphate was reported for 1955-56; manufacture of this material by the Tennessee Valley Authority the only producer, ceased in the year ended June 30, 1954.

The consumption of potash materials for direct application increased only 0.9 percent (from 401,084 tons to 404,839 tons). Among the individual materials, the use of the 58-62 percent grades of potassium chloride, which comprised 76 percent of the total consumption of potash materials, showed the largest increase in quantity (27,821 tons, 10 percent).

As in previous years, calcium sulfate accounted for most of the tonnage of secondary and trace nutrient materials; the proportion was 94 percent (738,499 tons) in 1955-56.

The weighted average primary nutrient content of the various classes of materials consumed is given in table 7. These averages are based on the composition and tonnage of the individual materials comprising the respective classes. In 1955-56 for materials containing only nitrogen, P_2O_5, or K_2O, the respective national averages were 32.35, 16.55 (available P_2O_5), and 55.64 percent, while the multiple-nutrient materials averaged 22.71 percent. The corresponding averages for these classes in 1954-55 were 31.00, 19.37 (revised), 54.56, and 21.64 percent. That the national averages for most of the classes were higher in 1955-56 than in the preceding year reflects generally the greater use of the higher analysis products. The lower average for available P_2O_5 results from the large increase in the tonnage of phosphate rock which contains only 3 percent of available P_2O_5.

PRIMARY NUTRIENTS

The quantities of primary nutrients in fertilizers are based on the average analyses of samples of the various products as published by fertilizer control official for the State in which they were consumed, rather than on the manufacturers' guarantees. Thus, the overruns or underruns of nutrients from the guarantees are taken into account. This gives more nearly the actual tonnages of nutrients than would be the case if only the guarantees were used. The actual nutrient content usually averages somewhat higher than the guarantee.

In 1955-56 the primary nutrient content of fertilizers (mixtures and direct application materials) comprised 1,932,603 tons of nitrogen, 2,247,420 tons of available P_2O_5 (2,643,418 tons of total P_2O_5), and 1,874,718 tons of K_2O (table 6). Compared with the preceding year, consumption of these nutrients decreased by 27,933 tons (1.42 percent) of nitrogen, 36,240 tons (1.59 percent) of available P_2O_5, and 225 tons (0.01 percent) of K_2O, while total P_2O_5 increased 46,699 tons (1.80 percent). Although the consumption of fertilizers bearing these nutrients in 1955-56 was 2.42 percent below that in 1954-55, the total quantity of the nutrients (nitrogen, available P_2O_5, K_2O) themselves was only 1.05 percent lower.

Mixed fertilizers supplied 41.22 percent of the nitrogen, 79.43 percent of the available P_2O_5 (71.79 percent of the total P_2O_5), and 88.28 percent of the K_2O. The respective quantities of these nutrients consumed as mixed fertilizers were 0.86, 1.98, 2.37, and 0.18 percent lower than in the preceding year. While the tonnage of mixed fertilizers in 1955-56 was 3.73 percent lower than that in 1954-55, the total quantity of nutrients (N, available P_2O_5, K_2O) contained therein was only 1.07 percent lower.

Table 6—Consumption of Primary Plant Nutrients, Year Ended June 30, 1956[1] (in Tons)

State & Region	Content of Mixtures					Content of All Fertilizers[2]				
	Nitrogen	P_2O_5		K_2O	Total N, Avail. P_2O_5, and K_2O	Nitrogen	P_2O_5		K_2O	Total N, Avail. P_2O_5, and K_2O
		Available	Total				Available[3]	Total[4]		
Maine	13,625	20,472	21,591	22,110	56,207	14,209	21,114	22,257	22,152	57,475
New Hampshire	769	1,554	1,686	1,646	3,969	1,045	2,095	2,236	1,717	4,857
Vermont	1,270	5,124	5,279	5,488	11,882	1,523	8,698	8,975	5,654	15,875
Massachusetts	3,829	5,758	6,004	5,670	15,257	4,975	6,741	7,083	6,096	17,812
Rhode Island	737	1,348	1,384	1,376	3,461	892	1,440	1,480	1,422	3,754
Connecticut	3,288	4,989	5,262	5,453	13,730	4,542	7,202	7,592	6,393	18,137
New England	23,518	39,245	41,206	41,743	104,506	27,186	47,290	49,623	43,434	117,910
New York	30,730	57,833	61,659	48,487	137,050	38,096	66,122	70,562	49,521	153,739
New Jersey	13,370	25,537	26,351	25,157	64,064	15,888	27,083	28,111	25,686	68,657
Pennsylvania	30,482	70,299	73,017	67,367	168,148	35,554	78,044	82,343	68,088	181,686
Delaware	4,084	9,394	9,768	9,906	23,384	5,085	9,598	10,026	10,181	24,864
District of Columbia	125	167	180	94	386	182	208	223	97	487
Maryland	12,309	29,677	31,531	27,154	69,140	14,332	30,687	33,043	27,515	72,534
West Virginia	3,163	9,106	9,756	1,729	19,998	3,902	10,462	11,213	7,785	22,149
Middle Atlantic	94,263	202,013	212,262	185,894	482,170	113,039	222,204	235,521	188,873	524,116
Virginia	25,861	74,554	79,595	72,173	172,588	38,508	76,895	82,382	75,010	190,413
North Carolina	54,349	126,859	136,917	122,705	303,913	109,598	130,926	142,114	130,678	371,202
South Carolina	21,933	62,144	66,600	59,098	143,175	63,045	65,164	70,055	71,949	200,158
Georgia	42,262	102,972	110,353	103,412	248,646	88,446	111,776	119,635	108,281	308,503
Florida	68,793	81,693	99,528	100,844	251,330	86,186	85,122	109,576	104,528	275,836
South Atlantic	213,198	448,222	492,993	458,232	1,119,652	385,783	469,883	523,762	490,446	1,346,112
Ohio	47,064	134,393	142,491	132,410	313,867	57,672	139,456	149,512	134,705	331,833
Indiana	49,861	144,602	149,381	144,232	338,695	77,358	152,832	162,323	168,539	398,729
Illinois	30,448	75,555	78,979	77,308	183,311	72,784	119,292	289,201	123,934	316,010
Michigan	31,597	87,904	91,360	88,148	207,649	39,584	90,841	95,029	89,321	219,746
Wisconsin	15,127	61,350	63,774	72,027	148,504	20,811	62,874	66,735	76,174	159,859
East North Central	174,097	503,804	525,985	514,125	1,192,026	268,209	565,295	762,800	592,673	1,426,177
Minnesota	14,941	62,493	64,079	45,883	123,317	32,347	80,173	82,313	48,273	160,793
Iowa	20,228	56,968	59,527	39,304	116,500	43,917	81,143	87,055	44,838	169,898
Missouri	36,752	65,459	68,853	54,161	156,372	71,396	80,189	152,182	65,970	217,555
North Dakota	2,087	6,705	7,027	1,432	10,224	6,101	24,935	25,743	1,446	32,482
South Dakota	1,005	2,341	2,490	172	3,518	4,486	6,451	6,754	193	11,130
Nebraska	2,088	4,327	4,380	770	7,185	49,072	16,139	16,582	939	66,150
Kansas	7,866	16,757	17,304	4,248	28,871	33,688	43,478	44,980	5,302	82,468
West North Central	84,967	215,050	223,660	145,970	445,987	241,007	332,508	415,609	166,961	740,476
Kentucky	20,130	50,691	54,943	49,868	120,689	32,450	62,726	71,827	58,527	153,703
Tennessee	20,553	48,416	52,135	45,484	114,453	45,724	54,886	59,403	53,089	153,699
Alabama	31,678	86,644	92,876	67,926	186,248	82,748	96,036	103,930	73,664	252,448
Mississippi	19,054	32,175	34,629	27,202	78,431	116,497	48,578	53,723	41,162	206,237
East South Central	91,415	217,926	234,583	190,480	499,821	277,419	262,226	288,883	226,442	766,087
Arkansas	10,849	22,569	23,850	22,622	56,040	61,555	30,548	32,234	42,397	134,500
Louisiana	10,603	21,309	22,525	16,722	48,634	51,784	26,908	30,045	20,319	99,011
Oklahoma	5,675	12,576	13,146	5,163	23,414	10,764	24,420	26,354	5,722	40,906
Texas	22,066	42,702	44,718	21,219	85,987	87,711	82,207	86,994	21,937	191,855
West South Central	49,193	99,156	104,239	65,726	214,075	211,814	164,083	175,627	90,375	466,272
Montana	373	789	831	36	1,198	3,523	9,304	9,446	74	12,901
Idaho	756	867	1,010	143	1,766	11,081	10,602	11,002	223	21,906
Wyoming	201	424	447	34	659	947	3,414	3,486	50	4,411
Colorado	1,339	2,303	2,430	737	4,379	9,375	11,329	11,589	1,166	21,870
New Mexico	268	331	348	47	646	6,063	6,419	6,611	93	12,575
Arizona	2,437	2,933	3,057	545	5,915	35,997	13,677	14,037	1,266	50,940
Utah	469	577	644	166	1,212	6,017	4,901	5,127	186	11,104
Nevada	82	117	125	44	243	404	425	444	46	875
Mountain	5,925	8,341	8,892	1,752	16,018	73,407	60,071	61,742	3,104	136,582
Washington	2,825	5,264	5,455	3,961	12,050	37,998	13,612	14,055	5,640	57,250
Oregon	2,826	4,133	4,402	2,559	8,978	31,131	12,811	13,309	4,345	48,287
California	25,918	25,894	26,732	15,247	67,059	208,378	77,909	80,676	23,345	309,632
Pacific	31,029	35,291	36,589	21,767	88,087	277,507	104,332	108,040	33,330	415,169
Continental U.S.	767,605	1,769,048	1,880,409	1,625,689	4,162,342	1,875,371	2,227,892	2,621,607	1,835,638	5,938,901
Hawaii	7,752	5,222	5,222	11,016	23,990	24,356	8,206	9,128	20,717	53,279
Puerto Rico	21,316	10,803	12,159	18,247	50,366	32,876	11,322	12,683	18,363	62,561
Alaska[5]	---	---	---	---	---	---	---	---	---	---
Territories	29,068	16,025	17,381	29,263	74,356	57,232	19,528	21,811	39,080	115,840
Total: 1955-56	796,673	1,785,073	1,897,790	1,654,952	4,236,698	1,932,603	2,247,420	2,643,418	1,874,718	6,054,741
1954-55	803,541	1,821,087	1,943,822	1,657,864	4,282,492	1,960,536	2,283,660[6]	2,596,719[7]	1,874,943	6,119,139
1953-54	778,099	1,793,871	1,922,708	1,603,584	4,175,554	1,847,416	2,234,548	2,639,419	1,813,594	5,895,558

[1] Includes Government distribution.
[2] Total in mixtures and direct application materials.
[3] Including 2 percent of the collodial phosphate and 3 percent of the phosphate rock marketed for direct application.
[4] Including 22 percent of the collodial phosphate and 32 percent of the phosphate rock marketed for direct application.
[5] Data not available—estimated total plant nutrients in all fertilizers amounted to 700 tons.
[6] Revised by deletion of 702 tons of available P_2O_5 from the Pennsylvania total.
[7] Revised by deletion of 830 tons of total P_2O_5 from the Pennsylvania total.

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Table 7—Weighted Average Primary Plant Nutrient Content of Fertilizers, in Percent, Year Ended June 30, 1956[1]

State and Region	Mixtures[2]				Materials					Average Nutrient Content of Mixtures and Materials
					Single Nutrient[3]					
	N	Available P_2O_5	K_2O	Average Nutrient Content	N	Available P_2O_5[4]	K_2O	Multiple Nutrients[2]	Average Nutrient Content	
Maine	7.65	11.50	12.42	31.57	29.80	20.26	55.77	20.14	23.75	31.35
New Hampshire	6.32	12.76	13.52	32.60	27.59	20.02	55.08	11.28	21.40	29.75
Vermont	3.90	15.74	16.86	36.50	32.80	21.04	59.42	11.46	22.04	31.33
Massachusetts	6.54	9.84	9.69	26.07	18.27	19.11	58.80	10.95	16.30	24.01
Rhode Island	5.62	10.27	10.49	26.38	19.40	19.37	59.02	9.95	16.49	25.20
Connecticut	6.18	9.38	10.25	25.81	22.97	23.79	56.92	12.69	18.90	23.71
New England	6.77	11.29	12.01	30.07	23.03	21.28	57.68	12.26	19.60	28.35
New York	6.24	11.74	9.84	27.82	25.76	20.22	54.11	9.71	20.69	26.82
New Jersey	5.59	10.68	10.52	26.79	24.45	18.04	52.80	13.13	20.02	26.19
Pennsylvania	5.21	12.01	11.51	28.73	28.76	18.87	47.92	11.95	20.86	27.94
Delaware	5.06	11.65	12.28	28.99	33.41	23.03	60.78	9.37	31.77	29.14
District of Columbia	7.04	9.41	5.30	21.75	19.66	20.39	0	11.99	13.18	19.16
Maryland	4.63	11.17	10.22	26.02	28.32	16.61	21.58	12.37	21.99	25.80
West Virginia	4.22	12.16	10.32	26.70	22.38	21.30	61.25	10.78	21.52	26.09
Middle Atlantic	5.42	11.61	10.68	27.71	26.76	19.45	43.99	11.25	21.04	27.03
Virginia	3.84	11.08	10.73	25.65	21.47	22.60	14.59	19.58	20.07	25.01
North Carolina	4.02	9.39	9.08	22.49	21.42	16.14	39.03	14.74	22.07	22.42
South Carolina	3.56	10.10	9.61	23.27	20.35	15.07	56.62	28.32	23.27	23.27
Georgia	4.23	10.31	10.35	24.89	24.44	18.56	57.09	18.72	24.31	24.77
Florida	5.73	6.80	8.39	20.92	22.60	8.07	50.71	17.61	18.49	20.68
South Atlantic	4.40	9.26	9.47	23.13	21.99	15.11	40.30	19.10	22.26	22.98
Ohio	4.78	13.64	13.44	31.86	33.61	20.15	54.75	13.26	27.80	31.60
Indiana	5.41	15.70	15.66	36.77	41.96	21.27	61.09	29.97	42.05	37.48
Illinois	5.91	14.67	15.01	35.59	38.35	6.53	60.93	17.42	15.71	23.24
Michigan	5.46	15.19	15.23	35.88	35.28	18.99	50.41	10.38	25.06	35.05
Wisconsin	3.98	16.15	18.96	39.09	49.39	14.56	58.04	11.81	35.13	38.78
East North Central	5.15	14.91	15.21	35.27	38.97	7.92	60.45	15.46	20.67	31.60
Minnesota	5.16	21.60	15.86	42.62	59.62	43.11	59.74	37.26	48.90	43.94
Iowa	6.61	18.63	12.85	38.09	45.35	29.27	59.97	35.17	37.25	37.82
Missouri	8.08	14.39	11.91	34.38	43.27	5.48	59.81	24.84	17.20	26.85
North Dakota	8.75	28.10	6.00	42.85	38.55	45.75	60.46	51.95	49.12	46.96
South Dakota	10.67	24.85	1.82	37.34	51.49	39.77	60.37	42.95	44.31	41.84
Nebraska	10.18	21.10	3.75	35.03	56.10	42.23	61.74	44.15	52.45	49.76
Kansas	10.08	21.46	5.44	36.98	41.88	40.17	60.46	41.09	41.34	39.70
West North Central	7.19	18.20	12.35	37.74	48.64	19.26	59.90	41.73	33.46	35.91
Kentucky	4.66	11.73	11.54	27.93	34.70	23.10	55.12	38.83	32.13	28.73
Tennessee	5.01	11.80	11.09	27.90	37.64	25.41	59.26	20.06	37.13	29.79
Alabama	3.93	10.75	8.43	23.11	24.66	12.25	60.35	34.88	22.69	23.00
Mississippi	5.73	9.68	8.18	23.59	37.47	12.16	58.79	45.73	30.59	27.49
East South Central	4.62	11.00	9.62	25.24	32.66	15.30	58.19	31.07	29.00	26.43
Arkansas	6.19	12.88	12.91	31.98	38.04	36.54	60.08	36.62	41.71	37.02
Louisiana	6.48	13.03	10.23	29.74	40.00	17.57	57.98	32.65	36.01	32.63
Oklahoma	7.42	16.43	6.75	30.60	40.61	23.23	59.78	40.91	29.67	30.19
Texas	7.67	14.84	7.37	29.88	45.13	28.07	57.91	38.07	38.33	34.02
West South Central	7.00	14.10	9.35	30.45	41.04	26.25	59.71	38.17	38.03	34.13
Montana	9.98	21.14	.96	32.08	36.58	43.31	60.40	43.76	41.73	40.60
Idaho	14.05	16.11	2.66	32.82	35.70	40.47	60.89	39.74	38.12	37.63
Wyoming	10.93	23.06	1.85	35.84	32.77	46.03	60.40	51.86	44.25	42.75
Colorado	11.12	19.13	6.12	36.37	38.81	45.20	57.18	44.05	42.33	40.98
New Mexico	14.64	18.08	2.57	35.29	61.10	35.34	50.40	38.89	43.92	43.38
Arizona	13.95	16.78	3.12	33.85	37.06	35.13	54.45	32.76	35.87	35.62
Utah	10.36	12.75	3.67	26.78	34.43	40.90	60.40	44.83	37.73	36.11
Nevada	7.83	11.18	4.20	23.21	23.93	40.06	0	30.80	29.56	27.47
Mountain	12.38	17.42	3.66	33.46	37.94	40.82	56.16	36.69	38.68	37.98
Washington	7.86	14.64	11.02	33.52	37.90	34.29	58.61	32.90	37.21	36.37
Oregon	8.64	15.62	9.67	33.93	28.71	21.71	60.69	38.17	30.82	31.36
California	10.51	10.50	6.18	27.19	30.20	26.62	54.90	12.75	23.36	24.10
Pacific	10.04	11.42	7.05	28.51	30.95	27.09	57.01	15.11	25.41	26.01
Continental U. S.	5.28	12.18	11.19	28.65	32.69	16.53	55.47	22.60	27.42	28.27
Hawaii	11.86	7.99	16.85	36.70	23.15	20.28	59.59	57.69	29.96	32.66
Puerto Rico	11.77	5.96	10.08	27.81	23.54	21.61	55.50	22.00	23.58	26.87
Alaska[5]	---	---	---	---	---	---	---	---	---	---
Territories	11.79	6.50	11.87	30.16	23.31	20.48	59.54	46.90	27.75	29.25
U. S. Average:										
1955-56	5.39	12.08	11.20	28.67	32.35	16.55	55.64	22.71	27.43	28.29
1954-55	5.24	11.86	10.80	27.90	31.00	19.37[6]	54.56	21.64	27.88[6]	27.90[6]
1953-54	5.01	11.54	10.32	26.87	30.81	15.70	54.01	17.53	25.99	26.61

[1] Excluding materials not guaranteed to contain one or more of the primary plant nutrients, N, P_2O_5, or K_2O.
[2] Guaranteed to contain two or more of the primary plant nutrients.
[3] Guaranteed to contain one of the primary plant nutrients.
[4] Including 2 percent of the colloidal phosphate and 3 percent of the phosphate rock marketed for direct application.
[5] Not available.
[6] Revised: See table 6, footnote 6 for basis of revisions.

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Table 6a—Percent of increase or decrease in consumption of primary nutrients—year ended June 30, 1956 as compared with preceding year.

Region	N		Available P_2O_5		Total P_2O_5		K_2O		Total (N, avail. P_2O_5, K_2O)	
	Mixtures	Materials	Mixtures	Materials	Mixtures	Materials	Mixtures	Materials	Mixtures	Materials
New England	+ 0.25	— 7.14	— 0.31	— 2.51	— 1.34	— 4.11	— 4.78	—15.87	— 2.03	— 5.69
Middle Atlantic	— 5.85	—13.11	— 7.22	— 7.78	— 7.18	— 9.38	— 4.65	— 1.29	— 5.98	— 9.83
South Atlantic	— .99	— 5.13	— 1.55	+ .27	— 1.40	+ 7.27	+ 1.10	— 6.76	— .38	— 4.88
East North Central	+ 5.74	— 7.88	— 2.26	+ 2.74	— 2.78	+32.57	— 2.56	+ 2.84	— 1.38	— 1.78
West North Central	— 9.53	—16.27	— 6.90	— 5.87	— 8.22	+15.96	+ 1.46	+ 6.12	— 4.86	—11.01
East South Central	+ .63	+ 3.27	+ 2.53	— 1.91	+ 1.94	+ 2.36	+ 5.48	— 3.18	+ 3.28	+ 1.46
West South Central	+ 7.23	+10 86	+ 8.71	+ 4.34	+ 8.23	+ 4.17	+ 7.00	+11.33	+ 7.84	+ 9.15
Mountain	— 1.95	— 2.86	— 4.44	+ 1.21	— 5.31	— .19	+ 6.70	+31.26	— 2.41	— .86
Pacific	+ 1.04	+ 5.28	+ 7.80	+ 7.13	+ 7.51	+ 6.12	+14.92	— 2.43	+ 6.92	+ 5.37
Continental U. S.	— .43	— 1.66	— 1.94	— .11	— 2.32	+14.18	— .03	+ .98	— .92	— .95
Territories	—10.82	— 7.94	— 5.79	+ 7.92	— 7.72	+18.04	— 7.83	+ 6.97	— 8.60	— 3.56
United States & Territories	— .86	— 1.82	— 1.98	— .05	— 2.37	+14.20	— .18	+ 1.24	— 1.07	— 1.01

Table 6b—Nitrogen consumed in direct application materials—Years ended June 30, 1955 and 1956.

Material	Nitrogen, year ended June 30 1955	1956	Change
	tons	tons	tons
Ammonia, anhydrous	290,337	343,578	+53,241
Ammonia, aqua	46,617	62,510	+15,893
Ammonium nitrate	375,318	316,964	—58,354
Ammonium nitrate-limestone mix.	73,753	64,776	— 8,977
Ammonium sulfate	109,245	86,878	—22,367
Calcium cyanamide	14,121	13,515	— 606
Calcium nitrate	8,667	8,630	— 37
Natural organic materials	13,804	13,204	— 600
Nitrogen solutions	38,362	34,493	— 3,869
Phosphate materials	52,973	56,976	+ 4,003
Potash materials	2,525	3,153	+ 628
Sodium nitrate	99,463	87,699	—11,764
Urea	30,973	41,785	+10,812
Other chemical nitrogen materials	837	1,769	+ 932
Total	1,156,995	1,135,930	—21,065

Table 6c—Available P_2O_5 consumed in direct application materials—years ended June 30, 1955 and 1956.

Material		Available P_2O_5, year ended June 30 1955	1956	Changes
		tons	tons	tons
Ammonium phosphate:	11-48	18,241	23,265	+ 5,024
Ammoium phosphate:	13-39	14,574	16,568	+ 1,994
Ammonium phosphate-sulfate:	16-20	53,240	52,295	— 945
Basic slag		12,252	14,115	+ 1,863
Calcium metaphosphate		27,100	26,786	— 314
Diammonium phosphate:	21-53	1,508	7,523	+ 6,015
Natural organic materials		12,282	9,740	— 2,542
Phosphate rock & colloidal phosphate		17,924	27,757	+ 9,833
Phosphoric acid		7,669	7,515	— 154
Potash materials		211	73	— 138
Superphosphate: 22% and under		137,878	122,500	—15,378
Superphosphate: over 22%		153,528	147,622	— 5,906
Other phosphates		6,166	6,588	+ 422
Total		462,573	462,347	— 226

Table 6d—K_2O consumed in direct application materials—years ended June 30, 1955 and 1956.

Material	K_2O, year ended June 30 1955	1956	Change
	tons	tons	tons
Cotton hull ashes	279	368	+ 89
Lime-potash mixtures	1,477	1,418	— 59
Manure salts	551	246	— 305
Natural organic materials	7,789	5,838	—1,951
Potassium chloride	190,258	194,754	+4,496
Potassium magnesium sulfate	1,418	1,480	+ 62
Potassium sodium nitrate	1,996	2,518	+ 522
Potassium sulfate	12,764	12,926	+ 162
Wood ashes	144	129	— 15
Other potash materials	403	89	— 314
Total	217,079	219,766	+2,687

Fertilizer materials for direct application supplied 58.78 percent of the nitrogen, 20.57 percent of the available P_2O_5 (28.21 percent of the total P_2O_5), and 11.72 percent of the K_2O. The quantities of nitrogen and available P_2O_5 consumed as fertilizer materials were, respectively, 1.82 and 0.05 percent lower, while the quantities of total P_2O_5 and K_2O were, respectively, 14.20 and 1.24 percent higher than in the preceding year. Although the tonnage of materials bearing these nutrients increased 0.62 percent over that in 1954-55, the total quantity of nutrients (N, available P_2O_5, K_2O) supplied thereby decreased 1.01 percent. In 1955-56 the increased consumption of phosphate rock was largely responsible for the increase in the tonnage of materials and of total P_2O_5. The phosphate rock used for direct application averages 32 percent total P_2O_5 but only 3 percent available P_2O_5.

The percentage difference in the quantity of primary nutrients in fertilizer mixtures and materials used in 1955-56, as compared with the quantity in the preceding year, is shown by regions in table 6a. The West South Central region was the only region in which increases occurred in the quantities of each of the nutrients in both mixtures and materials. In 1955-56 the total quantity of primary nutrients in the mixed fertilizers used in the United States and Territories decreased 1.07 percent; nitrogen, available P_2O_5 and K_2O decreased 0.86, 1.98, and 0.18 percent, respectively. In the case of fertilizer materials the total quantity of nutrients decreased 1.01 percent; nitrogen and P_2O_5 also decreased—1.82 and 0.05 percent, respectively—but K_2O increased 1.24 percent.

Tables 6b, 6c, and 6d show the quantities of primary nutrients in the materials applied directly as fertilizers in the years ended June 30, 1955 and 1956.



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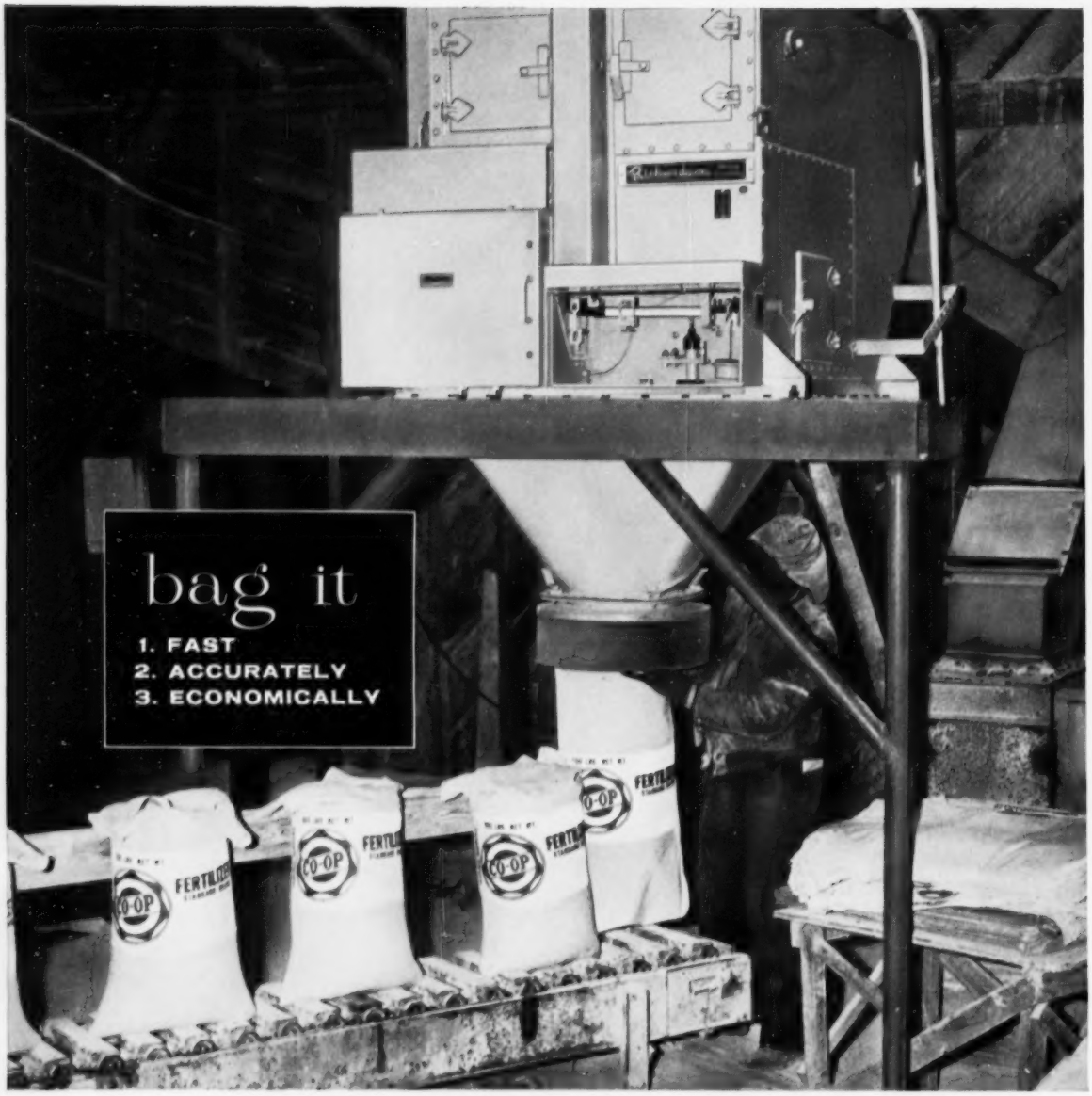
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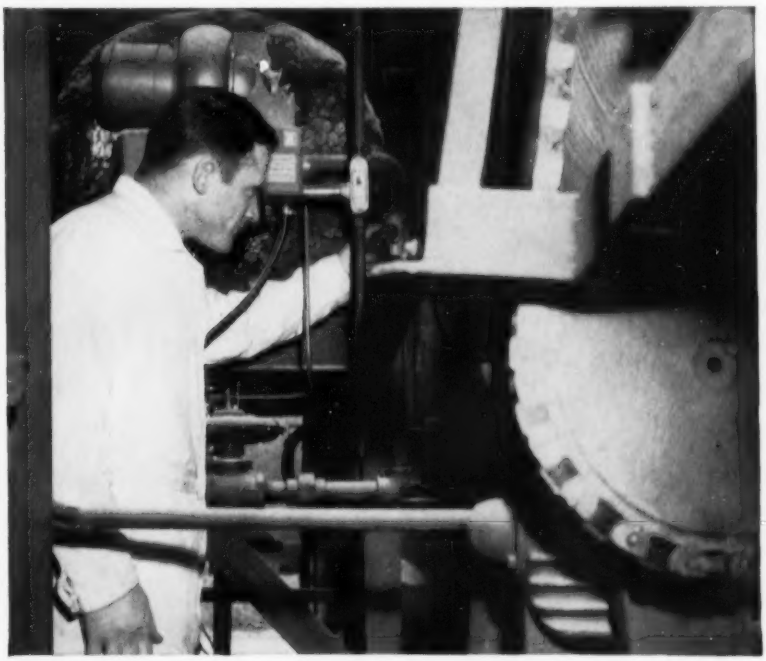
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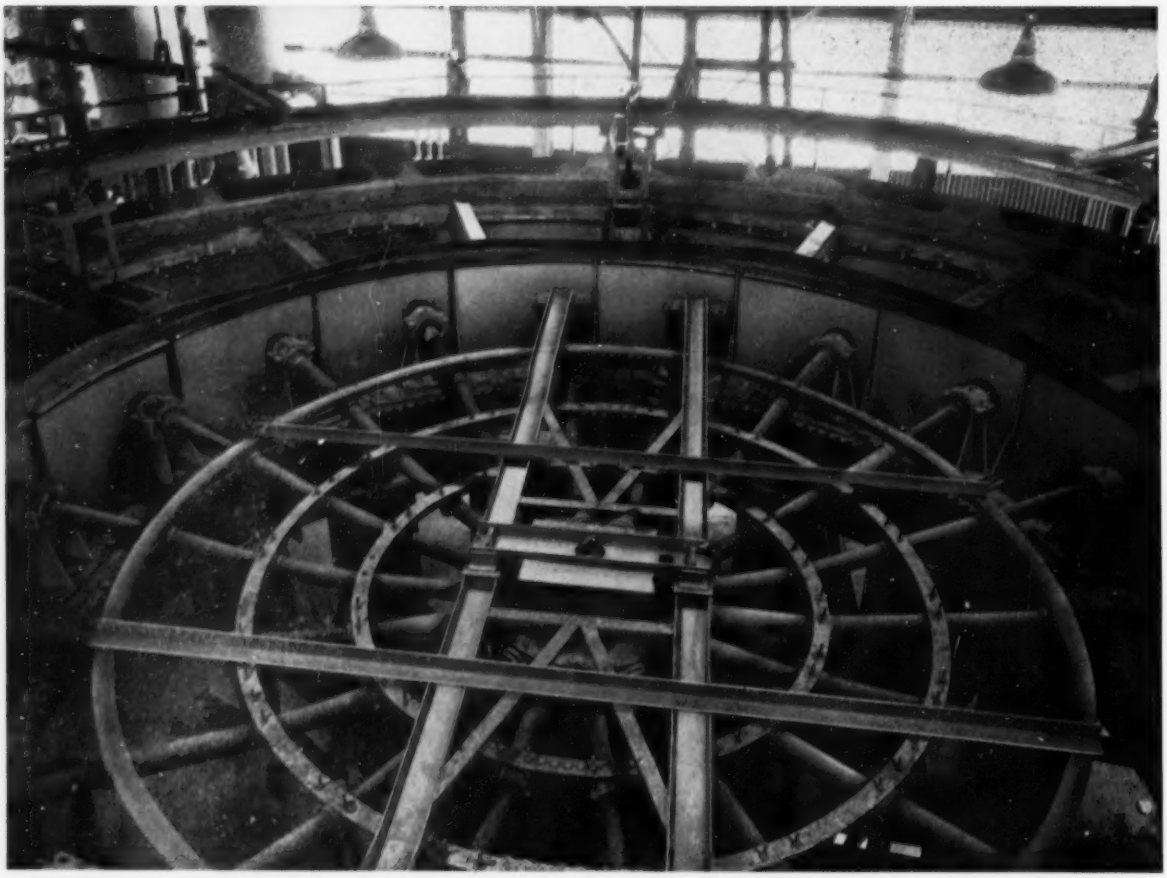
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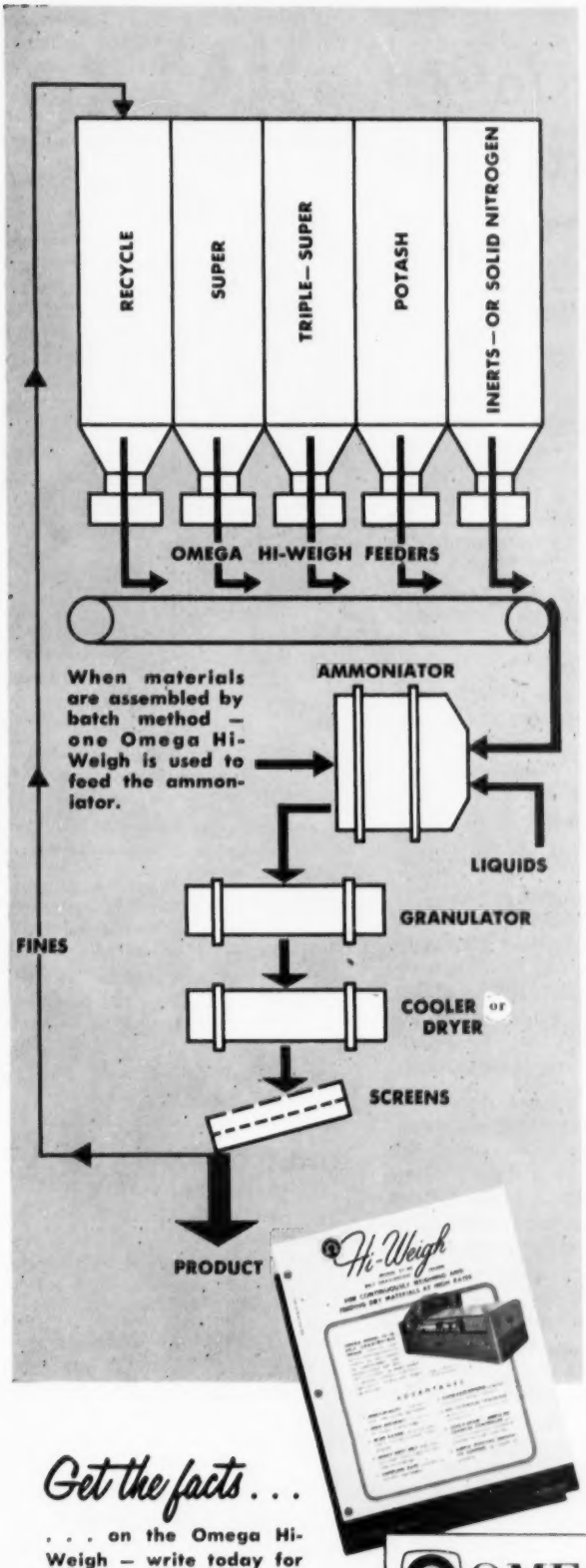
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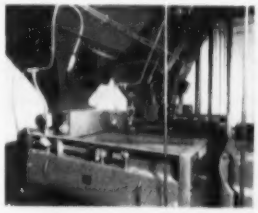
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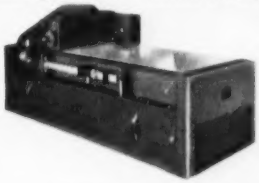


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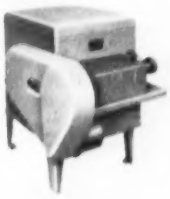
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Random NOTES & QUOTES

Sislers Law is a formula developed by an orchardist in the State of Washington. He says the way to tell when apple trees will bloom is pure arithmetic. The trees come alive when the temperature reaches 43 degrees. From then on the trees must get an accumulated total of 1,000 degrees before the blossoms will burst. So out in Wenatchee, the local newspapers are running a daily thermometer which shows the number of degrees gained since the first 43 degree day.

O

New Zealand claims for its own "aerial topdressing" and it is done now on such a massive scale that the smaller type planes are being replaced by ships capable of up to a ton of payload, and they are testing planes up to six ton capacity.

O

Kentucky farmers can save $1,000,000 of the $35,000,000 they will spend for fertilizer this season by using higher analysis fertilizers, according to George Corder, of the Kentucky AES. He suggests replacing 3-9-6 with 4-12-8; 3-12-12 with 5-20-20.

O

Slow Leaching urea-form fertilizers are getting a big hand around the country because they do not shoot the grass up where it needs cutting too often. And as the cheers of ordinary lawn-mowing home-owners meet those of greenskeepers, the scientists are busy testing these new plant foods on all types of plants in addition to grasses. Dr. Grau, who used to be director of the Golf Greens Section at Beltsville makes a good point: "It is no miracle fertilizer, but it does have built in foolproofness. Even five times the recommended application won't injure the plant."

O

The Fear that he may be injuring the human race has caused William T. Thompson to stop making insecticides at his Thompson Chemical Corp., St. Louis and Los Angeles. He felt that upsetting the balance between predator and parasite insects might deal a damaging blow to the farm economy. Anyhow, he says, pesticides have only a temporary value as the insects become immune after a while.

O

"We Look Forward to the future with conservative optimism," said William P. Drake, president of Pennsalt, at their annual meeting. "Evidence of this is the greatly accelerated program of investment now under way. In 1955 our investment in new facilities amounted to $3,600,000. In 1956, $12,000,000 was invested, of which approximately $2,250,000 was working capital. Programmed and under way for this year are additional projects requiring additional investments of $18,000,000 including $1,600,000 in working capital."

O

According to USDA, production of the chloriated hydrocarbon group of insecticides in 55-56 was 80,418,000 pounds as compared to 64,031,000 the previous crop year. Notably in the corn belt aldrin and heptachlor are being used increasingly, and more than half of the treated acreage in Illinois and Iowa got their insecticides in mixtures with fertilizer.

O

Shock of transplanting can be overcome by use of a starter solution—NPK dissolved in water—says the University of New Hampshire's J. T. Kitchin . . . 5-10-5—six pounds in 50 gallons of water, or three tablespoons in a gallon. At least a half pint and not less than a pint per plant should be used.

ONLY ONE STAYED PUT

USDA, having made a study of the subject, reports that fertilizer is the only farm production item that has not shown a net increase in price since last year.

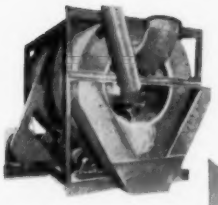
WORKING WORMS

In an acre of land, earthworms will bring to the surface more than 35,000 pounds of soil a year. Deponent sayeth not how many worms are thus involved.

TAX STRUCTURE

Dow Chemical's Leland Doan told the Manufacturing Chemists at their annual convention that the nation must make tax structure changes appropriate to the changing value of the dollar.

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SACKETT AMMONIATOR
A performance-proved machine combining the desirable T.V.A. submerged ammoniation design with Sackett time-honored rugged construction. Select the size you need from 15 to 60 tons per hour.



SACKETT STAR* GRANULATOR
This new machine has been called "The Missing Link" so badly needed in granulation. It performs the important job of forming a far greater portion of the initial feed into pellets of acceptable size. Select yours from a complete capacity range from 15 to 60 tons per hour.

The Sackett STAR* Granulator is an entirely new and revolutionary approach to the granulation of fertilizer mixed goods.

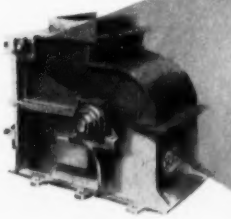
Here's what the STAR will give you:

CONTROLLED GRAIN SIZE
New concept of grain size control. Larger percentage thru 6 on 16 mesh range, smaller portions of under and oversize.

HIGHER PRODUCT RECOVERY
Up to fifty percent increase in product recovery, because of its inherent, vigorous rolling—*not sliding*—action.

HIGHER PRODUCTION CAPACITY
More granulation the first time through, means substantially higher production capacity.

LOWER DRYING COST
Higher percentage of on-size in initial granulation means less fuel cost per ton due to lower hydration of total feed.



SACKETT BAR MILLS
This is the first mill, to our knowledge, that has been designed specially for use in *cracking* . . . not pulverizing . . . the granular oversize from the final product classifying screen. Its gentle impact action on the material accomplishes desired size reduction with minimum formation of fines.

Established Fertilizer producers are invited to get our up-to-the-minute counsel on their conversion and expansion programs. It is available without cost.

OTHER SACKETT PRODUCTS

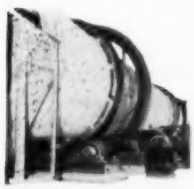
Batch Weigh Systems

Mixing and Shipping Units

Materials Handling Equipment

Superphosphate Manufacturing Processes

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These highly efficient direct heat gas or oil-fired units are built to give many years of service in spite of the severe conditions under which they must operate. Unique tuyere design combustion chamber assures reduced chemical losses and maintenance costs. Built in sizes to meet every capacity requirement.

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CF STAFF PICTURES FROM NPFI





1. W. J. Ray, Bemis Bro. Bag Co., St. Louis; Chas. Martin and Russell Martin, Miami Fertilizer Co., Dayton, Ohio.
2. Steele Wright, Texas Farm Products Co., Nacogdoches, Texas; John R. "Dugan" Taylor, Grand River Chemical Co., Pryor, Okla.
3. C. T. Prindeville, Swift & Co., Chicago; Fred J. Woods, Gulf Fertilizer Co., Tampa.
4. H. B. Tatum, U. S. Phosphoric Products Co., Tampa; Harold Kitchens, D. M. Weatherly Co., Atlanta.
5. G. B. Sloan, Superior Fertilizer Co., Tampa; Ray Cartledge, Cartledge Fertilizer Co., Cottondale, Fla.
6. Ray Yates, Asheraft-Wilkinson Co., Atlanta; Irvin Morgan, Jr., Farmers Cotton Oil Co., Wilson, N. C.; Charles Harding, Virginia-Carolina Chemical Corp., Richmond.
7. A. G. Grady, Mr. and Mrs. Leo Orth, all with Sinclair Chemicals Co., Chicago.
8. Oliver W. Terhune and Roy Bossolt, both with the Terre Co., Rochelle Park, N. J.
9. Leo Orth, Sinclair Chemicals, Inc., Chicago; D. A. Williams, Peavey Fertilizer Co., Fargo, N. D.
10. Dallas Cantwell and George Taylor, both with Southern Nitrogen Co., Savannah; L. G. Black, Ark-Mo Plant Foods, Corning, Ark.
11. Bruce Cloaninger, Assoc. of American Fertilizer Control Officials, Clemson, S. C.; B. F. Sutherland, Armour Fert. Works, Atlanta.
12. Dr. K. D. Jacob, USDA, Beltsville, Md.; M. F. Gribbins, E. I. Du Pont, Wilmington.
13. Grant Kilbourne, J. R. Simplot Co., Pocatello, Idaho; Edna Garman, Washington; Ben McCollum, J. R. Simplot Co., Pocatello.

NPFI EXPANDS PROGRAM

Members of National Plant Food Institute voted to double financial support of the organization's fertilizer market expansion program and promotional activities during their annual convention at White Sulphur Springs, W. Va., June 10-12.

Dr. Russell Coleman, executive vice president of the Institute, said that "the first step in the expansion program will be the employment of four regional managers and the establishment of regional Institute offices," as follows:

For the Mid-West, possibly in Chicago; for the Far-West, possibly in San Francisco; for the Southeast, possibly in Atlanta; and for the Northeast (undecided as yet, but perhaps even headquartered at Washington).

Dr. Coleman said "the objective of the program, in addition to expanding the fertilizer market by speeding up the acceptance of proper fertilizer usage, would be to further enhance the standing of the industry with farmers, agricultural workers and the general public.

"The fertilizer industry has a capacity to produce substantially more plant food than it is now selling. Yet agricultural leaders say that fertilizer usage should be at least twice the present consumption.

"Efficient use of fertilizer is one of the best ways farmers can reduce the per unit cost of production and the expansion program will enable us to focus greater attention on the plant food needs of farmers, all in keeping with the recommendations of the agricultural colleges."

Dr. Coleman said that a "unified program of action" under the direction of the Institute will include three projects:

1. To broaden and strengthen fertilizer research through increased grants to universities and colleges.

2. To initiate a farm demonstration program in cooperation with state and federal agencies.

3. To develop more specific informational programs based on the results from research and demonstrational projects.

"The plan will be principally concerned with developing the present market potential,' he said. "Farm demonstrations conducted in local areas will give the Institute information on which it can project a broad localized informational program. It is the purpose of this program to enlist the cooperation of local newspapers, radio and television stations, agricultural publications, bankers, dealers, professional agricultural workers and others to tell the fertilizer story based on agronomic and economic information."

Action by the membership to approve enlargement of NPFI's activities came at the business session on the opening day of the three-day meeting.

Potash producers who belong to the American Potash Institute voiced a protest at the method of assessing the increased cost of the program—pointing out, nevertheless, that they wholeheartedly approved the expansion program itself. These firms felt that some adjustment should be made for them, as they already bear the expense of the Potash Institute's field work.

While offering to double their present financial contributions to NPFI, the potash companies felt that a pro-rata apportionment of the long-range cost of the program would force their withdrawal from NPFI membership.

After numerous statements from the floor on the topic, there seemed a general feeling that the problem should be submitted to the new NPFI Board of Directors for reconsideration.

POTASH PRODUCERS STATE THEIR POSITION

Here are extracts from the statement by the president of the Potash Company of America, G. Fred Coope, a director of NPFI, as he explained his vote against the proposal:

"I want to make it very clear that I am not voting against the basic proposal to encourage use of fertilizer—that I heartily endorse. What I am voting against is the distribution of costs.

"The apportionment of costs is extremely inequitable for the . . . companies who for years have supported the American Potash Institute . . . (whose) program is substantially the same as now proposed by the Plant Food Institute and is constantly growing in size, cost and effectiveness . . . and costs the Potash Institute members more per year than is currently expended by NPFI on all of its activities.

"Because this Potash Institute program exists, the NPFI program will be that much easier and cheaper; but, I repeat, the Potash Institute program is financed by the member potash companies alone.

"When my company was told of the current proposal we studied it with care and concluded that the basic objective was commendable. However, as we were already deeply committed to the heavy expense of the Potash Institute, we concluded we could not bear the additional burden of this program as presented to us. I understand the other potash companies similarly affected felt the same.

"In summary, my company's position is simply that we cannot accept the inequitable allocation of costs of the proposal, and if it is adopted, my company intends to submit its resignation from the Plant Food Institute. I am told that other major producers . . . are of the same view and intend to take the same action."

Potash producers who are members of the American Potash Institute are: American Potash & Chemical Corporation, Duval Sulphur and Potash Company, Potash Company of America, Southwest Potash Corporation, and United States Potash Company, Div. United States Borax & Chemical Corporation.

ACTION OF NEW BOARD ON EXPANSION PROGRAM

Board of Directors in their meeting on June 12 approved for 1957-58 a budget roughly one-half again as large as the 1956-57 budget together with an increase in dues sufficient to support the higher budget.

The enabling amendments approved by the membership place a new maximum dues rate of 1/5 of 1% of net sales on nitrogen, phosphate rock, superphosphates, potash and sulfur produced or imported and sold as such for plant food use in the United States. The maximum dues rate for mixed fertilizer and other fertilizer materials was left unchanged, as was the current minimum of $100 per year.

To finance the first step in the expanded program, the Board authorized an increase in dues on the basic materials as indicated above from 1/20 of 1% to 3/20 of 1% of net sales. Dues for all other plant food materials and mixed fertilizers will remain at the current level of 1/20 of 1% of net sales.

NEW NPFI PRESIDENT, JOHN A. MILLER, COMMENTS

In commenting on the program, newly elected Institute President John A. Miller stated, "I feel sure that this move toward a program to expand fertilizer consumption is a wise one. We hope that all present members of the National Plant Food Institute will support it and help in developing the program."

Designed to increase fertilizer consumption in line with recommendations of agricultural authorities, the program contemplates the establishment of four regional offices to permit intensified and continuous work at local levels. Tentatively selected locations for regional offices are Atlanta, Chicago, and San Francisco. The location for the northeastern office is as yet undecided. The goal will be to work out "custom tailored" programs to suit each fertilizer-using area.

"It is our sincere hope," stated Mr. Miller, "that the entire industry will join with us in this important program designed for the mutual benefit of the ferilizer industry and the American farmer. Most of the nitrogen and phosphate producers have already agreed to support the expanded program at the increased dues rate. A number of the potash companies feel that the dues structure is inequitable as it applies to potash because they, as members of the American Potash Institute, already are paying a substantial amount into that organization. In this connection the Board of Directors authorized the president to appoint a committee to evaluate the total dues structure of the Institute to determine if any inequities exist. Members of the Board stated that they would like to see all Potash companies continue their membership in the Institute for at least a year, pending the study of the dues structure."

PANEL ON SIZE OF OUR MARKET

Prior to the business session, the initial session had heard a panel discussion on "How Big Is The Fertilizer Market?" featuring four well-qualified speakers evaluating the market from their respective vantage points.

Panel Moderator **O. E. Anderson,** secretary of Ohio Bankers Assn., Columbus, told the convention that "the American farmer can buy every pound of plant food in the next five years that the industry is able to sell him."

"Proof of that fact lies in the financial statement of American agriculture," he said. "Under date of February, 1957, USDA in Washington issued Volume 19 of the Agricultural Finance Review. The figures quoted therein through the year 1956 proved beyond any shadow of doubt that the farmers of this nation are financially capable of tackling any project in which they are interested. As a whole, they could double their use of plant food. Yes, credit-wise, they could triple their use of fertilizer."

He pointed out that "the total assets of American farmers at the beginning of this year stood at $170,-100,000,000," and "total liabilities, on the other hand, on that same date amounted only to $18,800,000,000."

"Those assets of $170 billion, which, incidentally, is the highest on record in the history of agriculture in this country, included real estate, livestock, machinery, crops stored, household furnishings and equipment, deposits in currency, U. S. Savings Bonds, and investments in cooperatives," he continued.

"Their liabilities, on the other hand, included only $9 billion in real estate debt, less than $5 billion in non-real estate debt, and less than $5 billion in all other obligations.

"Greatest proof of their ability to buy your product, or the product of any other industry, is the fact that their equity in what they own today also is the highest on record, standing at $151,300,000,000.

"Can the rural banks of this country make loans for the purchase of fertilizer on the basis of that balance sheet? The answer is a resounding YES.

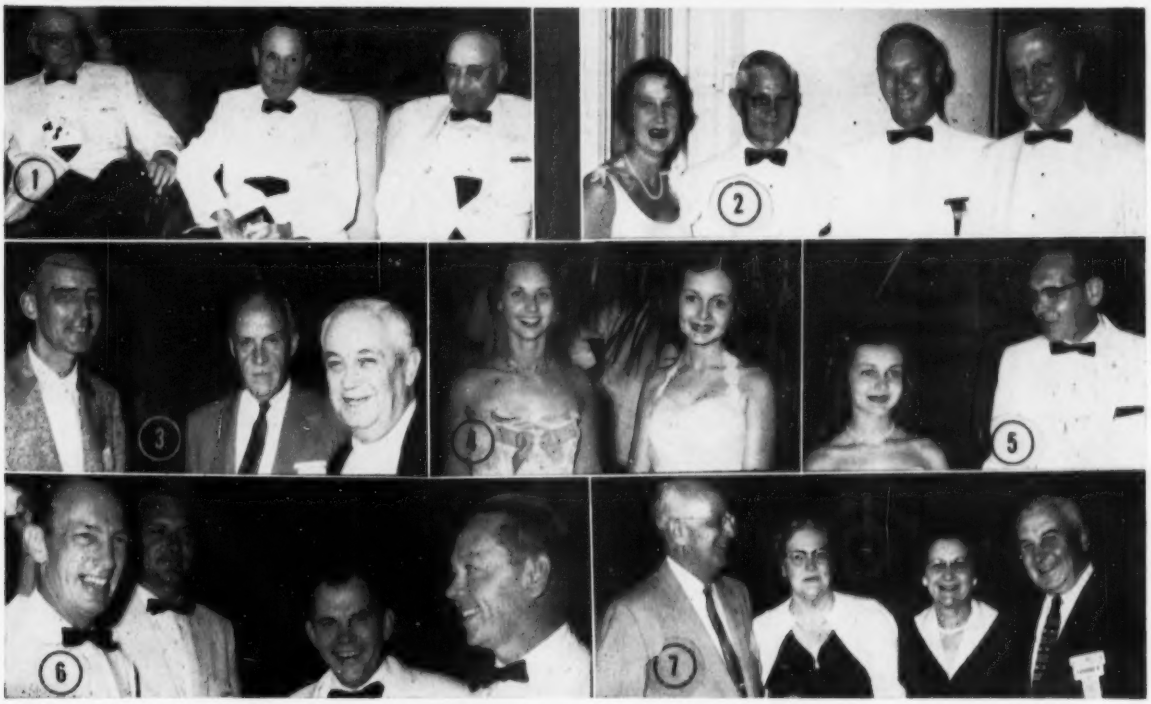
"Can the Extension Agents, the Agricultural Colleges, the Vocational Agriculture instructors, the Soil Conservationists, and everyone else interested in more efficient production of farm goods use this financial statement as the basis for intensifying their educational programs for greater plant food usage? Here again the answer is a definite Yes.

"Can the fertilizer industry, from the supplier of raw material through the manufacturer, the jobber, and the retailer, use this agricultural balance sheet as a foundation for the greatest merchandising program this industry has ever known? Again, the answer is, 'How can we doubt it?'

"We have a reluctant customer, but he is a customer with a terrific credit potential. I, for one, believe

1. Walter Meeken, Consolidated Rendering Co., Boston; Tracy Adcock, Swift & Co., Chicago; Kenneth C. Horner, USDA Washington.
2. True D. Morse, Under Secretary, U. S. Dept. of Agriculture, Washington; Phil T. Smith, Smith-Douglass Co., Norfolk.
3. A. A. Schultz, Reading Bone Fertilizer Co., Reading, Pa.; Philip McG. Shuey, Shuey & Co., Savannah; Dr. K. D. Jacob, USDA, Beltsville, Md.
4. B. B. Fall, Hubbard-Hall Chemical Co., Waterbury, Conn.
5. J. J. Devlin, Southwest Potash Corp., New York; Carl Veth and C. S. Schmelzer, both with Smith Agric. Chemical Co., Columbus, Ohio.
6. Bob Cocks, Farmers Co-Op Fertilizer Pur., Inc., Kenbridge; J. C. Crissey, Coop. GLF, Ithaca, N. Y.; Paul Schafer, American Cyanamid Co., New York.
7. Mrs. Fonville McWhorter, Waynesville, N. C.; Mrs. B. W. Bellinger, New York; Mrs. R. H. Linderman, Chicago.
8. Mrs. John Sanford, Waterbury, Conn.; Mrs. Clay Davis, Woodward, Ala.
9. Al Spillman, Fertilizer Mfg. Coop., Baltimore; A. A. Schultz, Reading Bone Fert. Co., Reading, Pa.; Tom Athey, Raymond Bag Corp., Baltimore; Mrs. Schultz; Otto Bernhardt, Sou. States Cooperative Fertilizer Service, Baltimore.
10. David Banks, Banks Fertilizer Co., St. Matthews, S. C.; Burke Garrette, U. S. Potash Co., Atlanta.





1. W. D. Barton, Tennessee Corp., East Point, Ga.; E. T. Spidle, Capitol Fertilizer Co., Montgomery, Ala.; J. H. Epting, Epting Dist. Co., Leesville, S. C.
2. Mrs F. H. Kennedy, Peoria; C. S. Schmelzer, Smith Agric. Chemical Co., Columbus, Ohio; Frank Kennedy, Potash Co. of America, Peoria; Red Appleton, Potash Co. of America, Peoria.
3. J. J. Devlin, Southeast Potash Corp.; J. V. O'Leary, Commercial Solvents Corp., both of New York; L. G. Black, Ark-Mo Plant Foods, Co., Corning, Ark.
4. Mrs. A. C. McCall, Baltimore; Anne Barley, Winter Garden, Fla.
5. George Barley Diamond R. Fertilizer, Winter Garden, Fla., and his daughter, Anne.
6. Morris Newman, Price Chemical Co.; D. T. Morris, Sam Shelby, and Jeff Stewart, all with Federal Chemical Co., Louisville.
7. Rep. and Mrs. Charles B. Hoeven; Rep. and Mrs. Ralph Harvey, U. S. Congress, Washington, D. C.

he can be persuaded to enter the market."

E. T. York, Jr., northeast manager of American Potash Institute, said the fertilizer industry "can play a vital role in showing the farmer the advantages of using fertilizers to attain more efficient levels of crop production."

"The job (of the fertilizer industry) is two-fold—to encourage and promote research aimed at developing know-how in fertilizer usage—information on the correct levels of fertilizer needed for most efficient production," Dr. York said. Historically, such research has paved the way for increased fertilizer usage. Then, there is the real task of getting the information to the farmer so that he can see the benefits and will be willing to adopt these improved fertilizer practices."

Dr. York said that "the fertilizer industry and particularly National Plant Food Institute can play a very vital role in helping to speed up the development and acceptance of improved farm practices leading to an even greater expansion in the fertilizer market than would be possible otherwise."

Emphasizing "the opportunities for increasing fertilizer usage," he cited estimates by representatives of the various agricultural colleges of increased amounts of fertilizers needed by the farmers in their respective areas. He pointed out that "these estimates range from an increase of 50 per cent to 300 per cent —or even as much as 1,000 per cent increase in plant food usage in some states."

He said that "two major factors which, in my opinion, will determine, to a large extent, the size of the fertilizer market in the years ahead" are (1) the demand for agricultural products and (2) the know-how and the desire of the farmer to produce those products more efficiently.

Relating the demand for farm products to an increasing population, Dr. York said that "when we take into consideration the fact that during the past few years we have been producing more of certain commodities than we need, it would appear that requirements for agricultural products will be about 1/3 higher in 1975 than current levels of production."

"In much of the country," he continued, "a deficiency of plant food is a principal factor limiting higher yields. We obviously have a great opportunity to increase production through proper fertilizer usage. I might even go one step further and say that increased production will, to a large measure, be dependent upon increased fertilizer usage." He added that expanded efforts in research and education could do much to speed up this rate of fertilizer increase.

Dr. York concluded that "in the light of the expected expansion in the need for farm products in the years ahead, NPFI has a wonderful opportunity to help show our farmers how to meet these needs more efficiently through increased fertilizer usage."

Wilbur Renk, outstanding farmer of Sun Prairie, Wisc., told that he "found fertilizer one of our great assets" on the 2,500-acre Renk farm.

"As our population increases there will be an increased use of fertilizer," Mr. Renk said. "But it will all be tied up to our farming economy. A hard-up farmer is not a generous buyer of fertilizer. So I believe you are just as interested as I am in the economic welfare of the farmer. Fertilizer helps us produce more and more economically. But let us all realize that we need to find new uses for crops as well as packages to better merchandise farm products. As the market expands farmers will buy many tons of fertilizer next year and in the years to come."

"We try to run an economic operation," he continued. "We set up goals we'd like to meet, and fertilize to meet them. Our goals are: 200 bushel corn crops, 100 bushel oat crops, 60 bushel wheat crops and a 6 ton hay crop. Now average land has only so many nutrients in the



soil. One or two big crops will bankrupt the soil. So if big crops are to be produced something must be added. You can't expect to plant corn on a hardwood floor and get a crop. There must be something under it. Each year all of our land is tested and a fertilizer prescription written to attain our goal.

"We have a 55-acre field of corn that has yielded 172.8 bushels per acre in 1954; 182.9 in 1955; and 167.8 in 1956. This field held its fertility with large amounts of fertilizer.

"Our cost of production was 56c per bushel on the above field.

"All of the small grain we raise is used for seed. Normally, it takes 200 lbs. of fertilizer for a grain field. This fertilizer costs $6.00, and the average return is $10.40—a profit of $4.40 per acre.

"Fertilizing for grain makes the straw stiffer, makes the kernel plumper and makes the grain ripen more evenly. So this is a hidden advantage that doesn't show in the grain bin.

"All of our pastures and hay fields are fertilized, both to get a better crop, and to balance the grass for our livestock. The cattle will pick up phosphate, calcium, and other minerals out of the soil, and thus not need so many minerals in their feed."

Gordon B. Nance, professor of Agricultural Economics at University of Missouri's College of Agriculture, Columbia, predicted that "the increase in the use of fertilizer in the next decade will be 2 or 3 times as rapid as it was in the last 10 years.

Prof. Nance said that the plant food industry is a "rapidly expanding business—that sales are increasing 8 per cent per year," adding that "this is a remarkable growth for any established industry, and is ordinarily attained only in new ventures—such as air conditioning, television, etc.—in their first few years."

"For example," he said, "even though this is considered an age of steel, petroleum and industrial expansion, steel and petroleum production increased only 45 per cent from 1945 to 1955 and industrial production only 28 per cent. But plant food production increased 120 per cent."

He emphasized that "the plant food industry has a growth potential much greater than that for any industry I know — either established or new."

"The profitableness of using fertilizer has been established and demonstrated for as long as I can remember, which is for more than a half century," he added. "This has been called to the attention of every farmer and other persons than can hear, read or see.

"Fertilizer pays dividends that are almost unbelievable to business investors in general or to farmers. Let us consider the returns on some popular investments. At recent prices, investments in General Motors pays 5.1 per cent; in United States Steel, 4.5 per cent; in Standard Oil of New Jersey, 3.9 per cent; in General Electric, 3.7 per cent; and in Du Pont, 3.6 per cent. Yet, business men are investing 3 million dollars a day in these securities.

"Compare the returns on these to those received from fertilizer. The data in the form that suited me best were from below-average land in the corn belt that was planted to corn. The corn was valued at $1.20 per bushel. The first $6.00 worth of plant food per acre returned 291 per cent; an additional $6.00 worth returned 227 per cent, and so on, and they had to use $40.00 worth per acre before the returns on the last addition declined to 5 per cent."

Prof. Nance said "several reasons have been advanced as to why farmers continue to buy so little fertilizer when it pays so well," and added that "none of these are satisfactory to me."

"One is the risk involved—they fear a bad weather year in which they will not get their fertilizer money back," he said. "If this is true, it is indeed strange that they raise, buy and feed cattle and sheep, which on the average returns $1.24 for each dollar's worth of feed used, and in one year in five does not even pay all of that dollar back. Also, if they have a bad cattle or sheep year, their loss is irretrievable —the money is gone. But if a drought prevents fertilizer from paying out one year, most of it is available for the next year's crop.

"A second reason advanced is that lack of money and credit limits

◄KEY TO CF STAFF PICTURES FROM NPFI

1. Tom Jones and Archie Edwards, both with Red Star Fertilizer Co., Sulphur Springs, Tex.; Delbert Rucker, NPFI, Washington.
2. J. W. Venable, Virginia-Carolina Chemical Corp., Richmond; Bob Walton, U. S. Potash Co., Atlanta; Howard Gould, Swift & Co., Bartow, Fla.
3. Mercer Rowe, Ashcraft-Wilkinson Co., Atlanta; Grayson Morris, Coop. Fertilizer Ser., Richmond.
4. D. H. Banks, Sr., Banks Fertilizer Co., St. Matthews, S. C., Gordon Cunningham, Tennessee Corp., Atlanta.
5. Vernon Bishop, Lebanon Chemical Co., Lebanon, Pa., R. H. McDougall, Nat'l. Assoc. County Agric. Agents, Butler, Pa.
6. Mrs. C. J. Strubble, Chicago; A. H. Carnes, Central States Fert. Co., Chicago; J. V. O'Leary, Commercial Solvents Corp., New York.
7. A. H. Bowers, Swift & Co.; Ernie Herrbach, Standard Oil Co., both of Chicago.
8. John Hall, Potash Co. of America, Washington; Mr. and Mrs. E. J. Buhner Fertilizer Co., Seymour, Ind.; R. W. Breidenbach, Commercial Solvents Corp., St. Louis.
9. J. A. Naftel, U. S. Borax Co., Auburn, Ala.; Fred Woods, Gulf Fertilizer Co., Tampa, Fla.; Ted R. Fisher, U. S. Borax Co., Columbia, Mo.
10. S. F. Taylor, E. I. Du Pont, Philadelphia; Frank Taylor, Jr., Wilson & Toomer, Jacksonville.
11. Bob Fischer, Milford Fertilizer Co., Milford, Del.; Graham Campbell, Chamberlain & Barclay, Cranbury, N. J., and T. C. Rogers, Nitrogen Div., Allied Chemical & Dye Corp., New York.
12. W. W. Belser, Birmingham, Walter Nordquist, Pittsburgh, both with U. S. Steel Corp.
13. Mr. and Mrs. A. N. Myers, Texas Gulf Sulphur Co., New York; W. R. Ashburn, Smith-Douglass Co., Norfolk.
14. T. E. Camp, Jr., Southwest Potash Corp., New York; Walter Harding, Federal Chemical Co., Louisville, Ky.; J. J. Devlin, Southwest Potash Corp., New York; H. E. Wood, Farmers Fertilizer Co., Columbus, Ohio.
15. M. K. McConnell, Commercial Solvents Corp., Monroe, La.; M. S. Wright, Texas Farm Prod. Co., Nacogdoches, Texas.
16. L. L. Jaquier, Phillips Chemical Co., Bartlesville, Okla.; Carl H. Haas, Haas Ammonia & Fert. Co., Modesto, Calif.
17. Ronald Stanton, International Ore & Fertilizer Co., New York; F. L. Wooten and T. W. Oliver, both with Armour Fert. Wks., Atlanta.
18. Mrs. James E. Totman, Bangor, Maine; Weller Noble, Berkeley, Calif., and Mrs. Ed Kolb, New York.
19. Leroy Donald, Monsanto Chemical Co. St. Louis; A. Wilkinson, Consolidated Mining & Smelt. Co. of Canada, Montreal; Sam Nevins, Olin-Mathieson Chemical Corp., Little Rock.
20. F. O. Davis, Potash Co. of America, Carlsbad, N. M.; Al Spillman, Fertilizer Mfg. Coop., Baltimore.
21. Larry Byck, U. S. Industrial Chemicals Co., New York; Carl Sparks, Buhner Fertilizer Co., Seymour, Ind.; R. W. Breidenbach, Commercial Solvents Corp., St. Louis.
22. Dudley George, Richmond Guano Co., Richmond; C. J. Watts, Jr., Commercial Solvents Corp., Atlanta.
23. Wm. H. Wilson, Virginia-Carolina Chemical Corp., Richmond; C. E. Reger, Hector Supply Co., Miami; Jack Bryant, Phillips Chemical Co., Tampa.
24. Mr. and Mrs. M. D. Broadfield, Arkansas Plant Food Co., N. Little Rock, Ark.
25. T. F. Bridgers, Farmers Cotton Oil Co., Wilson, N. C.; T. V. Hough, Kershaw Oil Mill, Kershaw, S. C.; Irvin Morgan, Jr., Farmers Cotton Oil Co., Wilson.
26. Jeff Stewart, Federal Chemical Co., Louisville, Ky.; King Ludington, Chase Bag Co., New York.
27. John Foy, Ashcraft-Wilkinson Co., Atlanta; B. W. Guess, Swift & Co., Chicago; Warren Huff, Ashcraft-Wilkinson Co., Columbus, Ohio.
28. John Zigler, International Minerals & Chemical Corp., Chicago; Fred Ioerger, Marion Plant Life Fertilizer Co., Marion, Ohio.
29. Len Gopp, International Minerals & Chemical Corp., Chicago; Grant Kilbourne, J. R. Simplot Co., Pocatello, Idaho; H. F. Roderick, International Minerals & Chem Corp., Chicago.
30. Walter Colvin, Nitrogen Div., Allied Chemical & Dye Corp., New York; Wendell Glaspey, Blue Valley Fert. Co., Marysville, Kans.; G. C. Matthiesen, Nitrogen Div., Allied Chemical & Dye Corp., New York.
31. Paul Schafer, American Cyanamid Co., New York; H. H. Tucker, Sohio Chemical Co., Lima, Ohio; Tom Cox, American Cyanamid Co., New York.
32. Jim Totman, Jr., Summers Fertilizer Co., Bangor, Maine; Bob Heuerman, International Minerals and Chemical Corp., New York.



1. T. J. Bosman, Nashville, Tenn., J. R. Sargent and S. E. Shelby, Louisville, all with Federal Chemical Co.; Angus Taylor, The Chemical & Industrial Corp., Cincinnati
2. Ben Pickering, U. S. Potash Co., New York; Jim Turner, U. S. Borax Co., Auburn, Ala.; Mrs. Pickering; Graham Campbell, Chamberlain & Barclay, Cranbury, N J.
3. Ed Smith, Potash Co. of America, Washington; Arthur Smith, Olin-Mathieson Chemical Corp., Baltimore; R. E. Bennett, Farm Fertilizers, Inc., S. Omaha, Neb.
4. Gene Van Deren, Blue Grass Plant Foods, Cynthiana, Ky.; Dean Gidney, U. S. Potash Co., and E. M. Kolb, American Potash & Chemical Corp., both of New York; C. S. Schmelzer, Smith Agric. Chemical Co., Columbus, Ohio.
5. Dr. and Mrs. Fielding Reed, American Potash Institute, Atlanta; Dr. and Mrs. Vincent Sauchelli, Davison Chemical Co., Baltimore.
6. George Barley, Diamond R Fertilizer Co., Winter Garden, Fla., and his daughter, Anne; Bob Walton, U. S. Potash Co., Atlanta.

fertilizer sales. I'm not impressed with this either. Farmers' liabilities are are only 11 per cent of their total assets, and less than their liquid assets—money, bonds, etc. Of course, some farmers lack the money or credit to buy the needed plant foods, but the number is indeed small. Some time ago I asked a country banker, whose patrons are mostly farmers, the percentage of his farmer patrons that he would not be willing to lend all the money they needed for full fertilization of all their crops. He said he would refuse such loans to less than 1 per cent of his farmer patrons. I'm morally certain that if the farmers that have the required cash or credit bought all the fertilizer they could use profitably, they would buy 5 or 6 times as much plant food as is now produced.

Prof. Nance pointed out that "another possible reason for the small use of fertilizer may be the lack of salesmanship used."

Following the panel **Dr. Russell Coleman,** executive vice president of NPFI, narrated a visual presentation on "How Your Institute Can Help Expand the Fertilizer Market" before outlining the contemplated expansion program.

That evening the nitrogen producers were hosts at a hospitality hour preceding dinner, and dancing followed the evening meal.

TUESDAY

Tuesday's general session brought two talks and a film before the convention assembly, over which NPFI President **C. T. Prindeville,** vice president of Swift & Co., Chicago, presided on both days.

The Honorable **Karl E. Mundt,** Republican senator from South Dakota, told the convention that "to return to an era in which the operation of economic principles and policies once again have a dominant part in determining our national destiny is going to require a substantial shrinkage of power, in the spending, and in the regulations of the Federal Government."

"By the same token," he added, "it is going to require a lot of added interest and effort on the part of individual citizens desiring to have their ideals have an impact on Government attitudes. The public must also learn a lot more about the political machinery of Freedom and where it needs fixing."

Senator Mundt, who is a member of the Senate Committee on Appropriations, Government Operations, Agriculture and Forestry, and the Investigating Committee, spoke on "Our Fight to Stay Free."

"Today," he said, "I think few, if any, among us will deny the fact that the Government has grown so strong and Federal spending has become so important that the political bias of our National Administrations determine the economic tone of our Nation and the financial status of millions of Americans, whether they be workers or farmers or businessmen."

Senator Mundt said that he was "happy to note and pleased over the fact that this year in Washington more attention is being paid to the 'political machinery' upon which our freedoms rest than in any previous session of Congress since the turn of the century."

The senator concluded that "we can have the kind of America we want—but to do so will require the modernization of our political machinery so that the desires of free Americans can be faithfully reflected by our voting procedures and our party organizations."

At the conclusion of the senator's talk the assembly saw a presentation of "The Bright Promise of the American Farm Market," **Fortune** magazine's new film.

Then **Dr. Raymond Rodgers,** professor of Banking in the Graduate School of Business Administration at New York University, told the group that "the American economy has lost its strong upward surge."

Speaking on "The Current Economic Outlook for Business," the nationally - known economist concluded that:



New Board Members (top): Nine of the 14 newly-elected members of the Board of Directors of NPFI are, left to right, (back row): Messrs. Thomas M. Ware, administrative vice president of International Minerals & Chemical Corporation; John L. Christian, vice president, Monsanto Chemical Company, Inorganic Chemicals Division; A. W. Mohr, president, California Spray-Chemical Corp.; Robert U. Hasianger, president, Escambia Chemical Corp.; Charles W. Baldwin, general manager of sales, United States Steel Corp.; T. F. Bridgers, president, Farmers Cotton Oil Company; and (front row) D. H. Banks, partner, Banks Fertilizer Co.; L. G. Black, president, Ark-Mo Plant Food Co.; and James E. Totman, president, Summers Fertilizer Company and Northern Chemical Industries, Inc. Below: Dr. Werner L. Nelson, American Potash Institute, new chairman of the Farm Management and Economics Division; A. H. Bowers, Swift & Company, new chairman of the Research and Education Committee; Dr. R. P. Thomas, International Minerals & Chemical Corporation, new chairman of the Agronomy and Horticulture Division; Dr. W. H. Garman, Secretary of the Research and Education Committee; and Joe Sharp, Spencer Chemical Company, new chairman of the Fertilizer Technology Division. Dr. Proctor Gull, Spencer Chemical Company, was elected vice chairman of the Research and Education Committee, but was not present at the annual business meeting. Not present in the picture are: Russell White, Stauffer Chemical Company, elected vice chairman of the Agronomy and Horticulture Division, and M. D. Sanders, Swift & Company, elected vice chairman of the Fertilizer Technology Division. Dr. Vincent Sauchelli will continue as chairman of the Chemical Control Committee of the Fertilizer Technology Division, and also will serve as secretary to the Fertilizer Technology Division.

"The constant increase in the cost of doing business is bound to have an effect on the purchasing power of the dollar. The process of inflation, in all probability, will continue, although not at the same rate as in 1956.

"Continuation of the increase in the cost of production and decline in the value of the dollar will cause further mergers and liquidations. Moreover, it makes it advisable for corporations to finance their capital requirements through bonds rather than through equities."

Dr. Rodgers said that "obviously, it is not possible to foretell with any certainty when the forces of inflation will come to an end."

"In fact," he continued, "as of now, the 'cards are stacked' against such a development, as the following upward pressures indicate:

"There is a strong inflation bias

1. Jim Totman, Summers Fertilizer Co., Baltimore; R. S. Mueller, R. S. Mueller Co., Baltimore; J. C. Totman, Jr, Summers Fertilizer Co., Bangor, Maine, and Mrs. Totman.
2. Mr and Mrs Quentin Lee, Cotton Producers Assoc., Tom Nixon, Ashcraft-Wilkinson Co., both of Atlanta; Mr. and Mrs. D. H. Banks, Jr., Banks Fertilizer Co., St. Matthews, S. C.
3. A. Wilkinson, Consolidated Min. & Smelt. Co., Montreal; Ben Jones, Sunland Industries, Fresno, Calif.; Hugo Reimer, Nitrogen Div., Allied Chemical & Dye Corp., New York; A. W. Mohr, Calif. Spray Chemical Co., Richmond, Calif.
4. Dr. H. B. Mann, Washington, D. C., and Dr. Werner Nelson, Lafayette, Ind., both with American Potash Institute; W. F. Price, Swift & Co., Chicago.
5. Frank Greeley, Fulton Bag & Cotton Mills, New Orleans; Mrs. Thos. Pitt; Thos. Pitt, Planters Cotton Oil & Fert. Co., Rocky Mount, N. C.; T. R. Moorer, Fulton Bag & Cotton Mills, Atlanta.
6. Mr. and Mrs. Joe Harrell, Southwest Potash Corp., Atlanta; James Purcell, Sylacauga Fertilizer Co., Sylacauga, Ala.; Ernest George, Imperial Cotton Oil Co., Macon, Miss.











1—Institute Officers: Shown with the newly-elected chairman of the Board of Directors of NPFI, C. T. Prindeville, center, vice president of Swift & Company, are executive vice presidents Paul T. Truitt (left) and Dr. Russell Coleman. Mr. Prindeville was elected chairman of the Board after serving as president.
2—Soil Builders Award: Carroll P. Streeter (left), Editor of FARM JOURNAL and Bill Kennedy (right) Editor of The GEORGIA FARMER, were presented awards for "superior journalistic contributions toward the building of the soils of our nation" by the National Plant Food Institute at the organization's annual meeting. The presentation was made by C. T. Prindeville (center) as president of the Institute (1956-1957). In the Institute's nation-wide "Soil Builders Award for Editors" contest, Mr. Streeter represented the winning magazine in the category of magazines with more than 300,000 circulation and Mr. Kennedy represented the winning magazine in the category of magazines with less than 300,000 circulation.
3—Dr. R. P. Thomas, International Minerals & Chemical Corporation, (center) is congratulated by Myron Keim (right), of Virginia-Carolina Chemical Corporation, outgoing chairman, Agronomy and Horticulture Division of the Research and Education Committee. Left: Russell White, of Stauffer Chemical Company, newly elected vice chairman of the Division of Agronomy and Horticulture.
4—Dr. Vincent Sauchelli, outgoing chairman, Research and Education Committee of NPFI with A. H. Bowers, Swift & Company, the new chairman, and Dr. W. H. Garman of NPFI staff who serves as permanent secretary of the Committee.



Walter J. Sackett, Jr., and Walter J. Sackett, Sr., both of The A. J. Sackett & Sons Co., Baltimore, on the porch at the Greenbrier.

in government, as is evidenced by the large expenditures of the Federal government, the farm price policy, stockpiling, etc. All these factors obviously contribute to inflationary pressures.

"It costs more to secure many raw materials since some of the best sources of such materials have been used up. A good example is the growing extent to which American industry has to go far afield to obtain iron ore.

"The cost of transporting goods is rising and this, apparently, will continue.

"Organized labor has adopted a policy of demanding an increase in wages and more and more fringe benefits each year. The cost of doing business therefore, despite the efforts of management to increase efficiency, will not only remain high but will continue to increase.

"Interest rates and corporate taxes also are elements of cost which, wherever possible, are shifted to the ultimate consumer. Corporate taxes are very high, and while it is possible that in the foreseeable future the corporate tax rate may go down to 50 per cent, anything much below that level cannot be expected for a long time. It is also fairly certain that interest rates will not go back to the levels of 1934-1951."

Dr. Rodgers said that "the cost of doing business must be expected to rise," and added that "nonetheless, it must be frankly faced that when the cost of doing business goes up, although keen competition may squeeze profits, this cannot go on indefinitely, as the profit margin is soon exhausted under such circumstances."

To stop inflation, he pointed out that two principal factors at the disposal of the government are "fiscal discipline and monetary discipline."

"Fiscal discipline means, primarily, that the government in periods of good business activity has a substantial budget surplus which it uses to reduce the public debt," he said. "As such discipline has not been practiced since 1953, it is not likely to be invoked willingly in the future."

Dr. Rodgers said that "no central bank in a democracy such as ours would dare adopt such drastic credit restrictive measures that large-scale unemployment would be inevitable."

The potash producers were hosts at a hospitality hour preceding the annual banquet, which was followed by entertainment and dancing that wound up the official program for NPFI's second annual convention.

NPFI LEADERSHIP FOR 1957-58

Officers: The Board of Directors of the National Plant Food Institute elected C. T. Prindeville, Chicago, chairman of the Board, and John A. Miller, Louisville, Ky., president of the organization for the fiscal year 1957-58. Mr. Prindeville is vice president of Swift & Company, and Mr. Miller is president of Price Chemical Company.

The Board re-elected Russell Coleman and Paul T. Truitt as executive vice presidents: W. R. Allstetter as vice president; Louis H. Wilson as secretary; and William S. Ritnour as treasurer; all of Washington, D. C.

Members of the Executive Committee elected are: C. T. Prindeville, Swift & Company, Chicago; E. A. Geoghegan, The Southern Cotton Oil Company, New Orleans; Marlin G. Geiger. W. R. Grace & Co., New York; John A. Miller, Price Chemical Company, Louisville, Ky.; Ralph B. Douglass, Smith-Douglass Company, Norfolk, Va.; H. A. Parker, Sylacauga Fertilizer Company, Sylacauga, Alabama; Dean Gidney, United States Potash Company Division of U. S. Borax & Chemical Corp., New York; John Christian, Inorganic Chemicals Division of Monsanto Chemical Company, St. Louis, Mo.; L. D. George, Richmond Guano Company, Richmond, Va.

New Board Members: Members of the National Plant Food Institute elected 12 new members to their Board of Directors for terms expiring 1960 and two members to the Board to fill unexpired terms. For terms expiring in 1960 the following were elected to the Board:

Charles W. Baldwin, United States Steel Corporation, Pittsburgh, Pa.; L. G. Black, Ark-Mo Plant Food Co., Corning, Ark.; T. F. Bridgers, Farmers Cotton Oil Co., Wilson, N. C.; Peter Colefax, American Potash & Chemical Corp., Los Angeles, Calif.; Ralph B. Douglass, Smith-Douglass Co., Norfolk, Va.; Sidney Ellis, Commercial Solvents Corp., New York, N. Y.; Robert U. Haslanger, Escambia Chemical

Corp., New York, N. Y.; Stanley Learned, Phillips Petroleum Corp., Bartlesville, Okla.; A. W. Mohr, California Spray-Chemical Corp., Richmond, Calif.; W. T. Steele, Cooperative Fertilizer Service, Inc., Richmond, Va.; James E. Totman, Summers Fertilizer Company, Baltimore, Md.; Thomas M. Ware, International Minerals & Chemical Corp., Chicago, Ill.

D. H. Banks, Sr., Banks Fertilizer Co., St. Matthews, S. C., was elected to the Board to fill the unexpired term of George W. Gage, Anderson, S. C., expiring in 1958, and John Christian, Monsanto Chemical Co., Inorganic Chemicals Division, St. Louis, Mo., was elected to fill the unexpired term of A. Frank Reed, of the same company.



SHOWN AT NPFI MEETING,

FILM PRESENTS US FARMER AS BIG CHEMICALS BUYER

Agricultural purchasing of farm production goods and services from industry, in terms of constant dollars, has risen 30% since 1947 and is now rated at more than $13 billion a year. This fact, and the upward spiral of farm assets and income, are disclosed in "The Bright Promise of the American Farm Market," a new 12-minute color cartoon motion picture distributed by Fortune Films and produced by Transfilm.

Essentially for marketing personnel, the film is designed to show the overall climate in which companies who sell to the farm market will be operating. It presents a close analysis of facts and figures to negate the popular belief that agriculture is going downhill. On the contrary, not only have farm expenditures increased, but farm assets are up 46% in the last ten years, states the film.

Approximately two million farms, less than half of the nation's total, account for 88% of cash farm sales and 85% of farm purchases from industry. These are the farms which are making a going business of agriculture, observes the film. The other 2½ million farms have been unable to yield more than a marginal return and, therefore, have brought down the general average of farm income. But, these farmers are gradually being absorbed in high wage industries.

Despite a marked decline in the number of farms since 1947, farm real estate value has shown a remarkable gain. From $69 billion then, it has risen to a record $103 billion today. More than one-third of this rise, declares the film, took place since 1953. And, 20% fewer farmers, working fewer hours, are turning out 20% more farm products than they did ten years ago. Productivity is up a staggering 45%. Not even industry has matched this rise.

Foreseen in the film is a rich harvest for both the farmer and the industries which serve him. It delineates the many factors which justify this claim. Population, for example, is increasing at the rate of four million a year and incomes keep rising. People are buying more and higher-valued food. With fewer farmers around to feed this bigger and wealthier population, agriculture must rely more on industry for mechanization, better soil nutrients and improved animal productivity. To accomplish this, states the film, the farmer is willing to make capital commitments relative to his own individual resources that would stagger our biggest corporations.

Ten years ago, 2,700,000 tractors worked our farms. Today, more than 4,800,000 are doing the job. Trucks are up 90%; grain combines up 110% and corn pickers, 180%. Farm machinery sales since 1947 have totaled some $20 billion, the film discloses. Along with this demand for mechanization, commercial fertilizers have risen 40%, fuels, 75% and animal feeds, 13%. But, observes the film, 60% of the man-hours on livestock farms are still spent on chores than can be mechanized, e. g., watering, brooding, feeding, cleaning, etc.

Greater per-acre yields of farm produce and more milk from grazing cows are being helped with supplemental irrigation via lightweight portable pipe and pumping equipment. Farmers spent $65 million for this material last year and are getting remarkable results. Cotton yield, for example, has jumped from one to four bales per acre. Milk production has increased one-third. The demand for such irrigation equipment is expected to be ten times greater by 1965, reports the film.

Food processing is being taken on by farmers to earn more of the consumer dollar. Now, they're buying packaging machinery, conveyor equipment, chemicals, tanks, plastics and the whole chain of supplies needed to process farm output. Also adding to farm income is refrigeration which has made frozen foods a multi-billion dollar a year business. Consumption of frozen juices alone has had a threefold increase in the past ten years. Refrigeration and low-degree refrigerated transportation, notes the film, have opened many opportunities for equipment sales.

More money for the farmer is also coming as a result of government and industry research which is constantly turning up new industrial uses for farm products. Corn protein becomes synthetic fibers; soy beans convert to paint ingredients; garden hose is made from animal waste fats and synthetic rubber from turpentine derivatives.

Drug and chemical manufacturers, notes the film, have been kept busy providing farmers with new pesticides, antibiotics, other biologicals, hormones and special feeds to improve animal productivity. Poultry has shown remarkable gains by in-

creasing production per man-hour by 33% in the past ten years.

Female-type hormones mixed into feed are increasing weight-gains of beef cattle 20% over normal at 12% less cost. Applied chemistry and production-line feeding methods are also improving hog output. Farmers, using high-level feeds, are getting less sow-to-pig disease, fewer runts, higher survival and meatier pigs ready for market sooner, reports the film.

Research, the film points out, is going forward on chemicals to control weeds, insects and disease in hay and pasture crops to help wipe out billion dollar yearly losses. And, science is developing new rust-resistant wheats, balanced plant foods, cures for livestock diseases and better hog and cattle breeds.

The motion picture concludes on the optimistic note that growth is everywhere in the country today, especially for the modern farmer. Few areas of American business will escape the farmer's great demand for materials and services.

"The Bright Promise of the American Farm Market" is for sale through Fortune Films, 9 Rockefeller Plaza, New York 20, N. Y.

HAS THE FARMER BEEN RESEARCHED OUT OF HIS MARKETS?

In Public Law 540, the 84th Congress established a five-man bipartisan Commission charged with the duty of making recommendations designed to bring about the greatest practicable increase in the industrial use of agricultural products.

In carrying out this assignment the Commission obtained the assistance of 188 of the country's outstanding leaders in agriculture, industry, and science, drawn from a wide range of private and public agencies. The 18 task groups or special committees in which they were organized represented all the agricultural products useful or potentially useful in industry. In addition, a number of technical experts served the Commission as consultants or staff members, and the U. S. Department of Agriculture and other government organizations were unstinting in providing help and information.

This Is The Problem

American farmers have succeeded so well in the necessary effort to increase their efficiency that they now consistently outrun the capacity of the economy to consume what they produce.

To cope with this situation, which has widespread disrupting effects on markets, government has resorted to costly programs for restricting land use, controlling production, and disposing of surpluses.

Though population is growing and living standards are rising, the productive capacity of our agriculture promises for many years to keep increasingly ahead of both.

An increase in exports seems unlikely as other countries become more and more self-sufficient.

It is widely agreed that American agriculture should for many reasons be kept at high levels of production and efficiency. Since there seems to be little prospect of a sufficiently large expansion of food markets in the next decade to use all the excess, the question becomes:

Can the economy develop profitable industrial markets capable of absorbing enough of the excess farm production to minimize, possibly even to eliminate, the need for costly restrictions, supports, and surplus-disposing operations?

Summary of the Report to the Congress from the Commission on Increased Industrial Use Of Agricultural Products.

This Is The Answer

The Commission believes the answer is an emphatic **Yes**, provided the necessary steps are taken to make possible and encourage such a development.

This conclusion is based on painstaking study, including the testimony of the scores of individuals with wide experience in the practical and scientific aspects of product utilization who made up the task groups and committees.

To make possible and encourage such a development there are four main needs.

The first is a sufficiently sharp sense—lacking so far—of the importance, the possibilities, and the urgency of the industrial utilization approach to farm surplus problems.

The second need is a greatly expanded program of fundamental and applied research — physical, chemical, biological, economic — to learn far more about the nature of agricultural raw materials and to determine what existing or new industrial products and processes might profitably use them. This work would not end in the laboratory; in promising cases it would go through the development stages of pilot-plant experiment and trial commercialization, which must precede full commercial use. The research and development program would mobilize the efforts of many scientific institutions—private, public, state, federal, and perhaps even some in other countries; and in some cases the government would share the cost of the research with private industries.

The third need is to ensure, through fellowships, scholarships, grants, and other means, that much more scientific talent is trained for and channeled into this neglected field of farm product research and development than it has engaged so far.

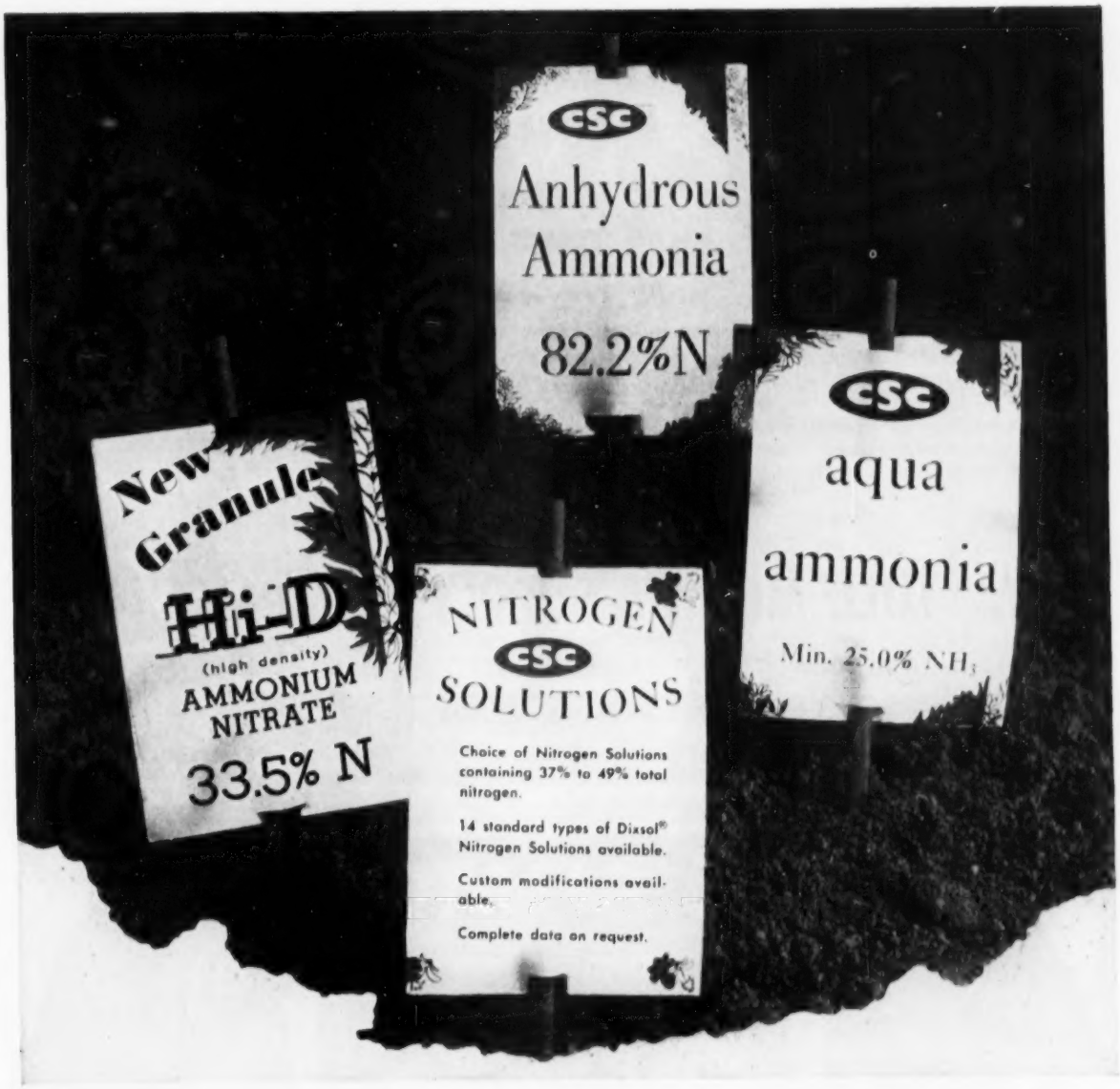
The fourth need is to provide in certain cases, suitable financial incentives during a temporary trial or development period — for example, new products or processes that are expensive to launch or that seem less promising than alternative uses of risk capital, or that might lead to especially rapid disposal of surpluses.

The initial step in launching such a program is sound legislative action by Congress.

What Industry Has Done

The expanded program of utilization research and development proposed by the Commission would enable agriculture to do what industry, with its bigger, better-integrated units and larger resources of money and men, has long been doing.

Industry is currently investing at least $3 billion a year, 3 percent of gross sales, in research. The result is obvious in a constant flood of



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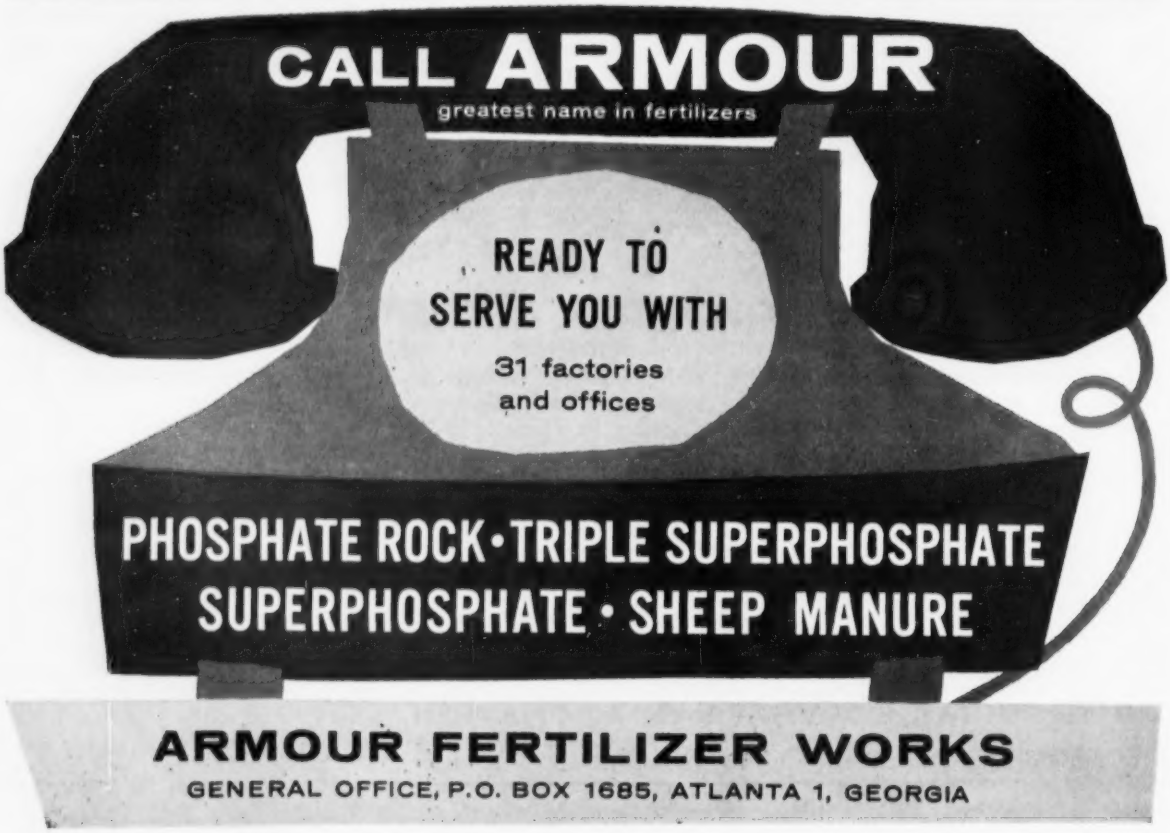
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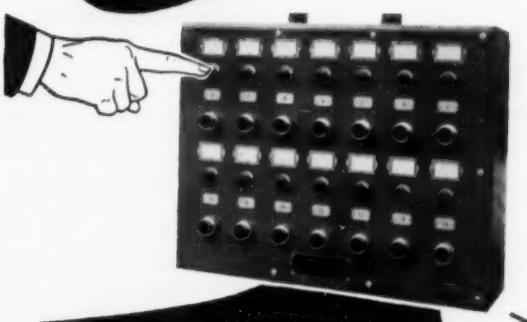
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Many of these so-called "miracle" products of modern research have provided the foundation for vast new industries and the stimulus for new consumer demands. Most of the products are based on non-agricultural raw materials, (particularly chemicals derived from petroleum), which are chemically taken apart and rebuilt (synthesized) in new forms. This search by industry is continuous, systematic, and intensive.

By contrast, agriculture spends not over $375 million on research—about one percent of gross sales; and most of this goes to improve and increase production. Federal and State governments spend $190 million of the total, of which no more than $18 million goes for utilization research.

So in recent years agriculture has been researched out of a good part of its natural markets. Nearly half the market for natural fibers—cotton, wool, flax, silk—has been taken over by synthetic fibers. Two out of three pairs of shoes are now made partly or wholly of leather substitutes. Two-thirds of the soap has been replaced by detergents, which do not use natural fats. Much of the paint and varnish bypasses linseed and other vegetable oils.

Agriculture Can Do

Raw materials produced by farmers are made of chemical components just as are most of the non-agricultural materials used to make the products mentioned. Coal and petroleum, in fact, are plants that died a long time ago.

Farm-produced materials, too, can be modified, tailored to particular needs, taken apart and recombined to make new products with new properties — plastics, films, fibers, coatings, and all the rest.

But with few exceptions materials from the farm have not had the intensive and systematic laboratory attention that has been given to those from other sources. When utilization research in agriculture has had the benefit of adequate expenditures and large teams of workers, the results have been outstanding—as in the case of commercial methods for producing penicillin, frozen concentrated fruit juice, nylon from corn cobs, various products from soybeans.

But because in the past food was never abundant enough, because manpower had to be released from the farms to run industry, because great wars created great necessities, most of the research funds in agriculture have always gone into production research — with revolutionary results in such fields as plant and animal breeding, control of diseases and pests, soil management, mechanization.

Partly because of the success of these efforts the time has come to create a better balance by giving more attention to utilization research.

The problems are not fundamentally different. Scientific brains of the kind that have so greatly expanded industrial markets can accomplish similar results with farm-grown materials.

But the problems are knotty, and it is not enough to learn from research that this or that agricultural product would be good for certain industrial uses. Other questions are equally important. Can it compete with products from non-farm sources, giving as good results at less cost or better results at a cost not too much higher? Will the price remain fairly stable? Will an adequate, reasonably steady flow of supplies be available? Can they be obtained without too much trouble? Can the quality be depended on? The possibility of favorable answers to such questions as these, which determine market acceptance, also depends to a large extent on research.

INDUSTRY CALENDAR

Date	Organization	Place	City
July 10-14	E. Canada Producers	Manoir Richelieu	Murray Bay
July 18-19	SW Fert. Conf.	Buccaneer Hotel	Galveston, Texas
Sept. 24-25	New England Fert. Conf.	Bald Peak Club	Ml'vn Vl'ge, N.H.
Oct. 3-5	Pacific N.W. Plant Food		Sun Valley, Ida.
Oct. 17	Chem. Control Procedures	Shoreham Hotel	Washington, D.C.
Oct. 17-18	Control Officials Assn.	Shoreham Hotel	Washington, D.C.
Oct. 31	Southern Fert. Conf.	Dinkler Plaza	Atlanta, Ga.
Nov. 1	Sou. Soil Fertility Conf.	Dinkler Plaza	Atlanta, Ga.
Nov. 3-5	Calif. Fert. Assn.	St. Francis Hotel	San Francisco
Nov. 6-8	Fert. Indus. Round Table	Sheraton Park	Washington, D.C.
Nov. 17-19	Nat'l Fert. Solutions Assn.	Netherland-Hilton	Cincinnati, Ohio
Dec. 11-13	Ag. Ammonia Inst.	Marion Hotel	Little Rock, Ark.
	1958		
Jan. 7-8	Texas Fert. Conf.	Memorial Center	College Station
Feb. 13-14	MidWest Soil Impr.	Edgewater Beach	Chicago, Ill.

Phillips Pacific Chemical Company's Coulee anhydrous ammonia plant, scheduled to start full-scale operations immediately, has a daily production capacity of 200 tons of anhydrous ammonia fertilizer. The Coulee plant is located in the Tri-Cities area of southeastern Washington, seven miles southeast of Kennewick and Pasco on the Columbia River. The plant is jointly owned by Phillips Petroleum Company and Pacific Northwest Pipeline Corporation. Phillips Chemical Company, a wholly owned subsidiary of Phillips Petroleum, is operator of the plant. W. D. Payton is plant manager. The anhydrous ammonia will be marketed throughout the Northwest by Phillips Petroleum Company's sales department, which has division offices in Spokane and Salt Lake City. Natural gas, one of the basic raw materials used in the manufacture of anhydrous ammonia, is supplied through Pacific Northwest's pipeline from the San Juan basin of New Mexico and Colorado. It was the availability of natural gas in the Northwest that made the construction of the plant possible. Construction was started just over a year ago by Hydrocarbon Construction Company under the direction of Fish Engineering Corp. With the start of full-scale operations, the Coulee plant joins the rapidly growing Phillips chemical family. Anhydrous ammonia is also produced in two of Phillips Chemical Company's plants in Texas. The Cactus plant, near Etter in the Panhandle, and the Adams Terminal plant, near Houston, have daily production capacities of 525 tons each. At the latter location, where Phillips has its largest concentration of chemical manufacturing plants, the company also manufactures triple superphosphate and ammonium sulfate fertilizers. Phillips produces ammonium nitrate fertilizer and nitrogen solutions at the Cactus plant.



TVA DEMONSTRATION DRAWS 400

Tennessee Valley Authority's pilot plant demonstration of new fertilizer processes drew more than 400 industry representatives from 34 states, three territories and three foreign countries to Wilson Dam, Ala. June 18-20.

Interest in the new developments was at a high pitch as key production men from plants in all sections of the nation sat in jampacked meeting sessions to hear TVA's Chemical Development personnel describe the processes and answer the many questions fired at them about each.

There were six discussion periods —one each morning and afternoon of the three-day gathering—devoted to the various processes, and each was followed by a visit to the pilot plant where a demonstration of the process just discussed was in progress.

At the initial session Charles H. Young, manager of Chemical Engineering, introduced Brigadier General Herbert D. Vogel, TVA Board chairman, who welcomed the group to the Development Center. J. H. Walthall, director of the Division of Chemical Development, outlined the plan and operation of the fertilizer research and development program at Wilson Dam. Then T. P. Hignett, chief of the Development Branch, described the purpose of the demonstration and the layout of the pilot-plant setup.

A. B. Phillips gave a summary of TVA's work on the use of diammonium phosphate in production of high-analysis granular fertilizers, followed by a tour of the pilot plant building where 12-24-12 was being run with diammonium phosphate as a material.

At the afternoon meeting the spotlight was on the new "super-

CF STAFF PIX

1. E. A. Heisler, Baugh & Sons Co., Baltimore; Joe Prosser, A. J. Sackett & Sons Co., Baltimore; and Ove F. Jensen, E. I. Du Pont Co., Wilmington, Del.
2. Roberto Fernandez Morrell and Enrique Rife, Productora de Superfosfatos, S. A., Havana; Al Henderson, Wilson & Toomer Fertilizer Co., Jacksonville; and Charlie McDaniel, Alabama By-Products Co., Birmingham.
3. Stanley Hackett, Dixie Fertilizer Co., Shreveport; and Frank Boyd, Virginia-Carolina Chemical Corp., Montgomery.
4. H. H. Tucker, Sohio Chemical Co., Lima; Robert B. Smith, York, Pa., and Roger Smith, W. Springfield, Mass., both with Eastern States Farmers Exchange; and C. M. Phinney, Sohio Chemical Co., Lima.
5. A. B. Tatum, U. S. Phosphoric Products, Tampa; and George Walton, Tennessee Corp., Cincinnati.
6. R. D. Young of TVA, F. A. O'Neall and W. B. Childs of American Cyanamid Co., Brewster, Fla.
7. Howard Miller and Paul R. Lennier, Pittsburgh Fertilizer Co., Pittsburgh, Texas.
8. Enrique Rife, Productora de Superfosfatos, S. A. Havana; Milton Malone, International Minerals & Chemical Corp., Atlanta; H. C. Williams, Fertilizer Engineering Sales Corp., Atlanta; and Monty Howell, Pasco Packing Co., Dade City, Fla.
9. Frank Taylor, Oregon-Washington Fertilizer Co., Seattle; and Paul T. Truitt, National Plant Food Institute, Washington.
10. Frederick Nichols, Nichols Seed & Fertilizer Co., Oklahoma City; T. H. Stewart, Grand River Chemical Div., Tulsa; and A. B. Phillips of TVA.
11. M. R. Siegel, TVA, Wilson Dam; and Fred Klem, U. S. Phosphoric Products, Tampa.
12. Arnold E. Roberts, Montgomery, and B. E. Adams, Hopewell, both with Nitrogen Div., Allied Chemical & Dye Corp.; and Charles O. Lawrence, Jr., Chas. W. Priddy & Co., Norfolk.



phosphoric" acid containing 76% P_2O_5. M. M. Striplin, Jr. outlined production and properties of the material, and A. B. Phillips described its performance in production of granular mixes. Questions were plentiful and answers were on hand for most during the discussion period that preceded the second plant tour to observe granulation of 5-20-20 grade with the 76% acid.

The second morning session featured a double-barreled program. M. R. Siegel reviewed TVA's use of the continuous ammoniator in production of ammonium phosphates and ammonium phosphate-nitrates, and R. D. Young spoke on production of superphosphate for immediate ammoniation, then the floor was thrown open to a barrage of questions before adjournment to the pilot plant area. Two units were in operation at the plant for this tour: an 8-16-32 ammonium phosphate-nitrate was being run off on the continuous ammoniator, while the superphosphate section was continuous cone-mixing a superphosphate suitable for immediate ammoniation.

On Wednesday afternoon, M. R. Siegel told the visitors about TVA experiments with the use of the continuous ammoniator in making nitric phosphates. After questions and discussion, the group adjourned to the pilot plant again to observe the production of a 12-12-12 grade nitric phosphate in the experimental granulation unit.

The final day of the "open house" was devoted to study of work which has been done in the pilot plant on use of the continuous ammoniator to make granular superphosphates and granular P_2O_5-K_2O grades. After A. B. Phillips outlined TVA's experience and methods in this field, an especially lively question-and-answer period followed, with other members of the TVA engineering staff climbing to the speakers platform to assist in giving some of the requested data. Afterward, the industry representatives returned to the plant where a run of granular concentrated superphosphate was being made in the ammoniator.

Throughout the three-day session, the liquid fertilizer pilot plant was in operation on morning and afternoon schedules of production utilizing the new "superphosphoric" (76% P_2O_5) acid. Mornings were devoted to batch production of 11-33-0 on the first two days, with aqua ammonia and water being combined with the new acid; the third morning brought 7-21-7 batching with superphosphoric acid, aqua ammonia, water, urea and potassium chloride. Afternoons were scheduled for continuous production operations on liquid mixtures; 11-33-0 was made from superphosphoric acid, water and aqua ammonia on Tuesday, and 11-36-0 was made from the new acid, gaseous ammonia and water on Wednesday.

The final afternoon of the meeting was left open for questioning and comments, with the entire TVA Chemical Engineering staff on hand to provide whatever answers and additional information they could.

PRODUCTION OF GRANULAR SUPERPHOSPHATES AND GRANULAR P_2O_5—K_2O GRADES IN TVA CONTINUOUS AMMONIATOR

Recent pilot-plant studies have shown that the reaction of phosphate rock and acid to form superphosphate can be carried out in a rotary drum mixer such as the continuous ammoniator. With proper control of conditions in the drum, granulation occurs during acidulation, and granular superphosphate is produced. This method has been applied to the production of granular concentrated, enriched, and ordinary superphosphate. Also, muriate of potash has been added during the mixing of rock and acid to produce granular P_2O_5-K_2O fertilizers.

The present process has the advantage of being simpler than the usual two-step process in which superphosphate is first produced and cured in nongranular form and then granulated with water and steam. The cost of rehandling the material is avoided, and the heat and plasticity of the freshly formed superphosphate permit granulation at a lower moisture content, thus reducing or eliminating the need for drying the product. The process should be useful to present producers of superphosphate who wish to produce a granular product and to fertilizer manufacturers who already have TVA-type continuous ammoniators and wish to extend their operating season by producing superphosphate.

Production of Concentrated Superphosphate

In the production of concentrated superphosphate, phosphate rock and recycle from the product screens are fed into the acidulating drum. Phosphoric acid and steam are fed under the bed of material in the drum. The steam is used to maintain the temperature and moisture level required for granulation. The granular superphosphate is discharged from the acidulating drum into the rotary granulator where the granules are compacted. The product of the granulator is cooled in a rotary cooler and then screened. The oversize from the screens is crushed and returned along with the fines from the screens to the acidulating drum to aid in control of granulation. Most of our pilot-plant work has been done with wet-process phosphoric acid since this acid is more generally used than electric furnace acid in the fertilizer industry.

In the demonstration run, granular concentrated superphosphate was produced from rock and wet-process phosphoric acid of the following composition.

Chemical composition, % by weight

	P_2O_5	CaO	Al_2O_3	Fe_2O_3	SO_3	F
Acid	53.6	0.05	0.9	1.2	2.9	0.3
Rock	32.2	46.3	1.7	2.1	—	3.6

The rock had been ground to about 75 per cent minus 200 mesh. The acid was metered by an "acid wheel" type of meter. The acid was preheated to about 250° F. and distributed under the front half of the bed of material in the continuous ammoniator through a drilled pipe distributor constructed of Type 316 stainless steel. Steam (100-p.s.i.g. line pressure) was added under the bed through the distributor normally used for ammoniating solution. Recycle consisting of fines and pulverized oversize material from the screens was fed to the drum. The production rate was 1 ton per hour. The flow rates used and the predicted results of the run follow:

Production rate, ton/hr.	0.75
Feed rate, lb./ton product	
Phosphate rock	820
Phosphoric acid	1280
Steam	185
Recycled fines	2350
Temperature, °F.	
Input acid	250
Acidulator product	212
Granulator product	195
Screen analysis of cooler product, %	
+6 mesh	38
−6 +10 mesh	20
−10 +20 mesh	25
−20 mesh	17
Chemical analysis of product after 2 weeks of curing, %	
P_2O_5	
Total	47.9
Available	46.9
W. S.	44.4
Free acid	2.1
CaO	20.3
H_2O	4.1
F	1.6
Conversion of P_2O_5 from rock, %	93

When using wet-process acid, the product from the cooler tends to cake on crushing equipment used to pulverize the oversize fraction. A roll mill followed by a cage mill was found to be suitable equipment for this operation, but a hammer mill was not satisfactory. The product also tends to blind the screens, making it necessary to clean them occasionally.

In tests with electric furnace acid, granulation was more easily controlled than with wet-process acid, granulation was more easily acid. It was not necessary to preheat the acid, and lower recycle rates could be used.

Products made with either acid have a porous structure which allows them to be ammoniated to about the same degree as nongranular superphosphate. They have satisfactory particle strength after curing and can be stored in piles without caking.

Production of Other Superphosphates

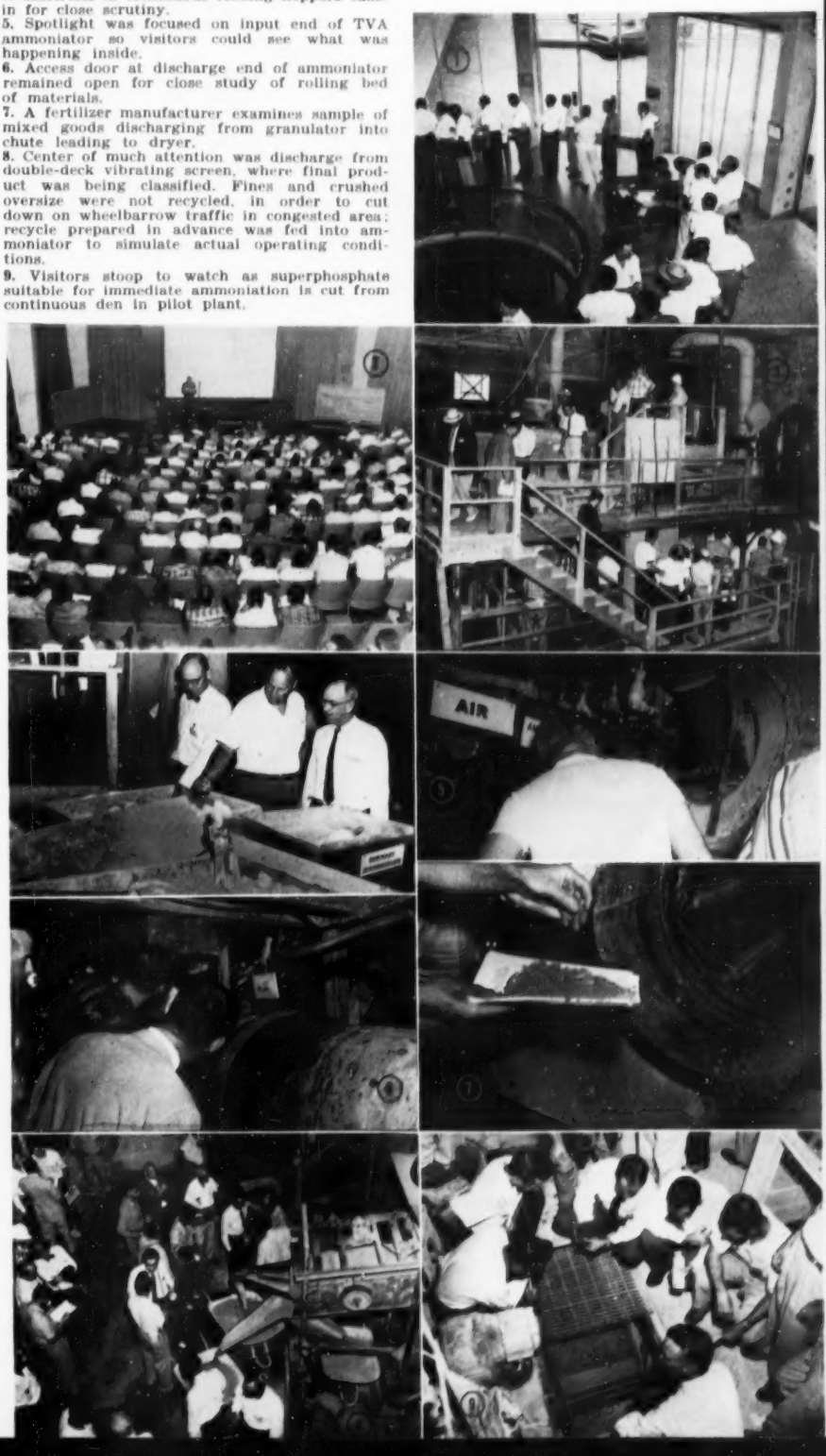
Ordinary superphosphate (20% P_2O_5) and one grade of enriched superphosphate (34% P_2O_5) have been produced in the pilot plant by similar means. The enriched superphosphate was produced by adding 92 per cent H_2SO_4 to the phosphoric acid upstream from the distributor. Operating conditions and results were about the same as described previously for the production of granular concentrated superphosphate. After 2 weeks of curing, the product contained 34.2 per cent total P_2O_5, 2.2 per cent C. I. P_2O_5, and 4.5 per cent moisture. The conversion of P_2O_5 from rock was 88 per cent.

In the production of granular ordinary superphosphate it was necessary to dry the recycle before it

AT TVA DEMONSTRATION

TVA STAFF PIX

1. Capacity crowd at TVA demonstration winds across lobby on opening day to register.
2. Each process was described and discussed in auditorium before adjourning to pilot plant for "live" demonstration.
3. Industry representatives had opportunity to examine each phase of every process close-up, with TVA personnel eager to answer questions about various steps.
4. Materials in continuous feeding hoppers came in for close scrutiny.
5. Spotlight was focused on input end of TVA ammoniator so visitors could see what was happening inside.
6. Access door at discharge end of ammoniator remained open for close study of rolling bed of materials.
7. A fertilizer manufacturer examines sample of mixed goods discharging from granulator into chute leading to dryer.
8. Center of much attention was discharge from double-deck vibrating screen, where final product was being classified. Fines and crushed oversize were not recycled, in order to cut down on wheelbarrow traffic in congested area; recycle prepared in advance was fed into ammoniator to simulate actual operating conditions.
9. Visitors stoop to watch as superphosphate suitable for immediate ammoniation is cut from continuous den in pilot plant.



was effective in controlling granulation. This was done by drying the product from the granulator. The onsize fraction (—6 +16 mesh) was screened out, and the oversize fraction was crushed to provide sufficient recycle. The onsize fraction was rehumidified to about 5 per cent moisture with steam in a rotary drum. Rehumidification with steam was necessary to provide sufficient moisture and heat for completion of the conversion reactions during storage. Data from the test are given below.

Production rate, lb./hr.	0.5
Feed rate, lb./ton product	
Phosphate rock (33% P_2O_5)	1151
Sulfuric acid (93% H_2SO_4)	738
Water	213
Steam	426
Recycle	4784
Moisture content, %	
Granulator product	5.0
Dryer product	2.6
Screened product (after rehumidification)	4.7
Screen analysis of dryer product, %	
+6 mesh	44
—6 +20 mesh	45
—20 mesh	11
Product analysis after 2 weeks of curing, %	
P_2O_5	
Total	21.7
Available	21.0
Free acid	0.8
CaO	29.7
SO_3	29.8
H_2O	3.3
Conversion of rock P_2O_5, %	97

Pilot-plant tests of the production of ordinary and enriched superphosphate are being continued to define more closely the optimum conditions for operation.

Production of No-Nitrogen Grades

Several grades of granular two-component fertilizers ranging in analysis from 0-14-14 to 0-26-26 have been produced in the pilot plant using rock to supply all or part of the P_2O_5. In this work the rock was acidulated in the continuous ammoniator by adding sulfuric or phosphoric acid under the bed as in the production of granular superphosphates. Other ingredients were potassium chloride and, in most cases, cured superphosphate. Water or steam was added to provide moisture for granulation and conversion of P_2O_5. The products were cooled but not dried. The oversize fraction, after screening, was crushed in a roll crusher and returned to the screens since large quantities of recycle were not required for control of granulation. Formulations and other data are shown in table 1.

The production of no-nitrogen grades by this method has several advantages over the usual method of granulating potassium chloride and superphosphate with water or steam. The plasticity of the fresh superphosphate formed is an aid to granulation. Stronger granules are obtained, the need for drying is eliminated, and part of the P_2O_5 can be obtained from low-cost phosphate rock. The exhaust gas from the acidulator presumably contains small quantities of hydrochloric acid and is quite corrosive. The process probably is not usable in plants in which the off-gas system is constructed of unprotected mild steel.

Table 1. Formulations and Data for No-Nitrogen Grades

Grade	0-14-14	0-14-14	0-20-20	0-26-26
Formulation, lb./ton product				
Phosphate rock	438	888	420	163
Concentrated superphosphate	—	—	574	771
Ordinary superphosphate	720	—	—	—
Sulfuric acid (94% H_2SO_4)	326	613	281	—
Phosphoric acid (78% H_3PO_4)	—	—	—	148
Muriate of potash	466	452	657	888
Water	150	140	100	—
Steam	—	—	50	125
Recycle, % of total feed	—	48	—	8
Ammoniator temperature, °F.	148	162	162	157
Granulation efficiency, % of +6 —28 mesh				
As granulated	71	63	61	49
After crushing oversize	89	72	87	84
Moisture content of product, %	6.0	4.1	3.7	4.3
Net conversion of P_2O_5 in rock, [1]%	95	94	98	92

[1]After 1 to 7 days of curing.

Del-Mar-Va's 36th Annual Meeting

The Del-Mar-Va Peninsula Fertilizer Association held its 36th annual convention June 29th at the George Washington Hotel at Ocean City.

The principal speaker was Wm. H. Mitchell, Department of Agronomy, University of Delaware, whose subject was "The Bunker Hill Project"; the National Plant Food Institute was represented by Russell Coleman, who was also on the program.

Entertainment for the ladies, as well as the men, was scheduled for the afternoon including a cocktail and coketail party, and also an informal dance in the evening.

Control Officials Meeting Oct. 17-18 in D.C.

A meeting of the American Fertilizer Control Officials association will be held at the Shoreham Hotel, Washington, D. C., October 17-18. The States Relations Committee will meet at 8 P.M. on the evening of the 17th. B. D. Cloaninger, secretary-treasurer, whose address is box 392 Clemson, S. C., says members of the industry and other interested workers are cordially invited.

FARM SAFETY WEEK

The President has proclaimed July 21-27 as National Farm Safety Week. Let's all celebrate it in fertilizer plants, too!

VC Announces New Defoliant

A new cotton defoliant which is reported to give reliable, dependable defoliation regardless of weather or rankness of cotton has been announced by Virginia-Carolina Chemical Corporation.

The new product, to be test marketed in Mississippi, Arkansas, Arizona and California this season, will be sold under the trade name Folex.

Folex contains the new chemical merphos (tributyl phosphorotrithioite) which was developed by V-C research personnel. V-C compounds Folex specifically for cotton defoliation and will market the product through the agricultural chemicals section of its chemicals division.

According to Frank Boyd, the company's southern agronomist, the new defoliant does not depend upon dew for activation and removes immature as well as mature leaves from the plant.

CF Staff-Tabulated TONNAGE REPORTS

FERTILIZER TONNAGE REPORT (in equivalent short tons) Compiled by Cooperating State Control Officials and Tabulated by COMMERCIAL FERTILIZER Staff

STATE	May		April		Jan.-Mar. Qtr.		July-December		January-June		YEAR (July-June)	
	1957	1956	1957	1956	1957	1956	1956	1955	1956	1955	1955-56	1954-55
Alabama	.....	155,509[1]	292,964	312,762	291,118	347,956	174,707	165,867	813,104	846,735	1,029,030	1,114,238
Arkansas	.....	40,577[1]	64,536	90,923	120,899	141,981	59,915	60,299	299,172	270,894	359,471	330,781
Georgia	301,056	280,937	322,144	343,425	221,375	216,862	253,559	250,968	993,954	1,047,875	1,244,422	1,273,445
Kentucky	.....	144,087[1]	.....	105,564[1]	173,850	168,371	90,284	91,478	441,481	431,024	529,600	522,410
Louisiana	42,699	33,722	48,929	67,269	82,709	93,469	71,129	59,345	214,343	232,781	273,638	310,848
Missouri	.....	85,055[1]	60,716	100,039	219,689	235,254	331,343	356,241	450,102	414,503	804,441	682,690
N. Carolina	.....	235,304[1]	483,082	418,843	534,774	581,897	216,234	225,182	1,424,267	1,566,158	1,649,449	1,830,633
Oklahoma	8,484	13,915	10,624	13,969	27,868	31,884	54,509	69,542	65,854	63,799	135,396	122,204
S. Carolina	72,526	88,324	199,381	169,465	393,741	452,619	122,929	119,947	743,670	796,111	863,617	928,715
Tennessee	137,378	121,941	86,741	97,059	48,649	50,736	165,796	154,260	378,676	355,966	515,551	523,349
Texas	60,589	65,024	72,506	77,188	205,547	180,802	202,406	193,704	377,805	375,176	566,399	588,062
California		(reports compiled quarterly)			204,270	280,853	412,747	361,615	639,377	603,657	1,001,554	922,127
Virginia		(reports compiled quarterly)			277,124	273,642	154,075	162,709	599,111	636,585	761,820	795,770
Indiana			(reports compiled semi-annually)				305,939	255,131	807,918	873,966	1,063,049	1,158,960
Iowa			(reports compiled semi-annually)				85,147	130,000	315,329[1]	.....	445,329[1]	.....
Michigan			(reports compiled semi-annually)				.....	.....	443,908[1]	.....	.....	.....
New Hampshire			(reports compiled semi-annually)				3,253[1]	.....	13,168[1]	.....	.....	.....
Washington			(reports compiled semi-annually)				55,709	48,749	103,885	124,186	152,674	182,348
Connecticut			(report issued annually)								76,660	84,494
Oregon			(report issued annually)				124,294[1]	.....	241,742[1]	.....	.....	.....
TOTAL	622,732	603,863	1,646,623	1,690,942	2,861,613	3,056,326	2,756,428	2,705,037	8,352,719	8,639,506	11,026,821	11,371,074

.....(not yet reported) * Not compiled [1] Omitted from column total to allow comparison with some period of current year.

MARKETS

ORGANICS: Movement of organic ammoniates continues steady but in tapering volume as the season approaches its end. However, manufacturers are booking contracts for the new season's shipment and prices continue steady for leather nitrogenous tankage at $2.75 per unit of Ammonia June through September and $3.00 October through December and $3.25 January/forward, f.o.b. midwestern production point. One of the largest producers reports a sold up position for June through September.

CASTOR POMACE: Current production continues to be practically nil and shipments are against previous committments. Price is nominally $45.50 per ton in bags f.o.b. Bayonne, New Jersey. Prospects for future supplies indicate extremely limited quantities.

DRIED BLOOD: Unground sacked Blood is indicated at Chicago at around $5.75 per unit of Ammonia and $5.00 in the New York area.

POTASH: After various price announcements from Domestic producers it appears that Standard Muriate of Potash prices have settled out to a basis of 34 cents per unit K_2O bulk f.o.b. Carlsbad, N. M. for June shipment; 34½ cents July, 35 cents August through May; and 34 cents June, 1958. Granular muriate of Potash is 64 cents. These prices apply for contracts made prior to July 1st. One importer of Potash indicates 56½ cents per unit K_2O ex-vessel for arrival prior to September 30 and 58 cents for bookings after June 30 for arrival after September 30; Sulphate of Potash at 86 cents for the first period and 88 cents for the second period ex-vessel usual Atlantic Ports.

GROUND COTTON BUR ASH: Demand and supply continues in good balance. Current analyses are running about 38/40% K_2O and the delivered cost compares favorably with Sulphate of Potash for most areas.

SUPERPHOSPHATE: This time of the season producers are endeavoring to curtail production, but prices remain steady and tending slightly upward. Demand is entirely seasonal.

PHOSPHATE ROCK: After a recent advance there was a decline in the price of fuel oil resulting in a lowering of the cost of phosphate rock to $5.16½ per long ton for 66/68% bulk, carlots f.o.b. mine: $5.56½ for 68/70%; $6.21 for 70/72%; $7.21½ for 74/75% and $8.21½ for 76/77% material.

CALCIUM AMMONIUM NITRATE: Prices of this 20½% Nitrogen material continue at $44.00 per ton in bulk and $48.00 per ton in bags, f.o.b. Hopewell, Va. and usual Atlantic and Gulf ports. Demand depleted stocks at the ports to the point where only one or two brands were still available, though new supplies were expected to arrive about the first of July.

AMMONIUM NITRATE: Demand continues strong for this 33½% Nitrogen product to the point where supply is somewhat short of the demand.

GENERAL: Throughout the southeast the season is practically over for mixed goods and what demand remains for fertilizer is usually for direct application nitrogen. In some areas usage of nitrogen during this season has exceeded figures for the same period last season whereas usage of mixed goods has been somewhat less than for the same period last season.

TREE NEEDS

The National Arborist Association lists these elements needed for tree growth: oxygen, hydrogen, carbon and nitrogen from the air; potassium, phosphorus and calcium from the soil; minute quantities of magnesium, sulphur, iron, manganese, copper, zinc, boron or molybdenum.

American Potash & Chemical will occupy on completion a $1,500,000 three story and basement building in Los Angeles as their world headquarters. The structure is being constructed for them on a 25 year lease.



WENDT **LUNDY**

American Potash & Chemical Corporation has established a technical sales services section to act as coordinating unit among the company's Production, Market Development and Sales departments.

Announcement of the technical services section was made by W. J. F. Francis, AP&CC vice president in charge of sales, who said the newly formed section would be a part of the Sales Department but would provide liaison on technical matters to the various departments.

Daniel A. Lundy, formerly western sales supervisor of boron and lithium prducts, will be western manager of the new section, while Nelson E. Wendt, previously head of northeastern sales, will be eastern manager. Lundy and Wendt will operate from the company's Los Angeles and New York offices respectively.

* * *

Southwest Virginia Co-op has been sold to **Southern States Cooperative** for about $450,000. The plant has been grossing about $1,000,000 in sales annually. It is located at Bristol, Va.; it was purchased from the Government in 1947. Southern States is said to have contemplated a competing plant in the same area.

* * *

The Indian Jute Mills Assn. and **The Burlap Council** have moved to their new offices in the Chanin Building, 122 E. 42d St. New York 17.

* * *

The Lummus Co. have unveiled the new engineering-development facilities at Newark, N. J., which were designed "to bridge the gap from laboratory bench to full scale plants. Lummus president J. F. Thornton estimated the cost of the new pilot unit at more than $1,000,000.

CHANGES

Daiichi Bussan Kaisha Ltd have moved their New York branch, of which **S. Minami** is manager, to 530 Fifth Avenue, and invited our readers to visit them there. The telephone number is YUkon 6-9600.

* * *

Magic Bloom, Orlando, Fla., has been purchased by **Roy T. Williamson** who was for 27 years plant superintendent at **Walker Fertilizer.** They produce fertilizers and pesticides.

* * *

Swift & Co. has terminated operation of their plant in LaGrange, Georgia. Deliveries will be made from their new, modern plants at Atlanta and Albany, according to E. H. Rappe, Atlanta manager. Much of the personnel has already been transferred to Atlanta. The plant will be offered for sale when supplies and machinery have been moved out.

* * *

Hercules Powder Company has changed the name of its **Missouri Ammonia Works** at Louisiana, Missouri, to **Missouri Chemical Works.**

The company said that the increasing number of chemical materials produced at the Louisiana, Missouri site caused the former name to be misleading.

Missouri Chemical Works has produced only anhydrous ammonia from the time Hercules purchased the plant in the spring of 1954 until a few months ago when production of pentaerythritol and formaldehyde began. A new methanol plant also is nearing completion at the site.

H. J. Baker Named Agent For Chicago Sludge Material

H. J. Baker & Bro. have been appointed exclusive sales representatives, effective July 1, for heat-dried activated Chicago sludge.

Chicago sludge tests about 5% nitrogen, 4% available phosphoric acid, 75% humus and trace materials. It is used as a source of organic nitrogen in the manufacture of complete fertilizers as well as for direct application on turfs, gardens, etc.

The company announcement noted that it is available in bulk to the fertilizer industry and can be shipped by freight car and barge. In addition to two primary plant foods and humus, the sludge contains calcium, magnesium, boron, manganese, copper, zinc, iron and potassium. Samples may be obtained from H. J. Baker & Bro. in New York, Chicago, Atlanta and Savannah, Ga. and Tampa, Fla.

NAC Annual Meeting Dates Announced

The National Agricultural Chemicals Association will hold its annual meeting in The Essex and Sussex, Spring Lake, N. J., September 4, 5 and 6, L. S. Hitchner, NAC executive secretary has announced. John A. Rodda, manager, Fairfield Chemical Division, Food Machinery and Chemical Corporation, is program chairman for the meeting.

26th Exposition of Chemical Industries in December

The Exposition of Chemical Industries will return to New York after an absence of six years, to be staged for the first time in the Coliseum during the week of December 2-6. The continued dynamic growth of the chemical process industries has resulted in some 500 exhibitors engaging space for displays that will occupy all four floors of the Coliseum.

FISH ARE SAFE

USDA says that aerial spraying with DDT might kill small numbers of fish, but would do no major damage to the fish population.

OBITUARIES

J. Ed Anderson, 71, retired organizer of the Anderson Guano Co., Timmonsville, S. C. died May 7.

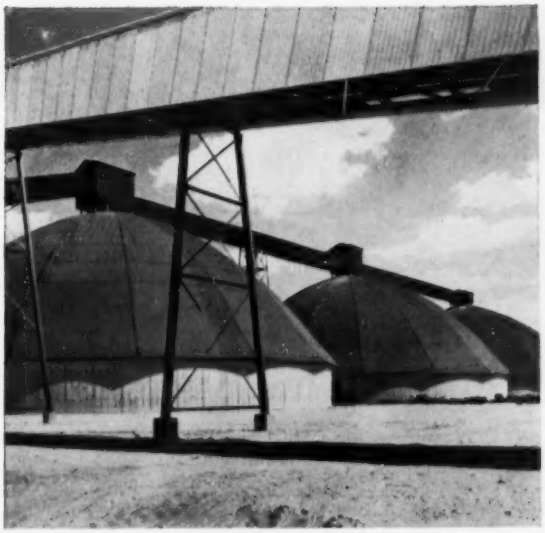
Moultrie Johnston Clement, from early youth in the fertilizer business, and organizer of the Merchants Fertilizer and Phosphate Co., Pensacola, Fla., died suddenly at his home May 18.

Walter Crady, founder of North American Fertilizer Corp., Louisville, Ky., died May 4 as the result of a fall sustained April 19.

John R. Scherm, vice-president The American Agricultural Chemical Co. died suddenly at his home, Upper Montclair, N. J., May 20.

C. Frank Sims, former New York division salesmanager for Virginia-Carolina Chemical, died May 7 in hospital at Plainfield, N. J. after a long illness.

Thomas J. Sullivan, 64, senior vice president Gulf Oil, died May 28 of a heart attack in Pittsburgh.

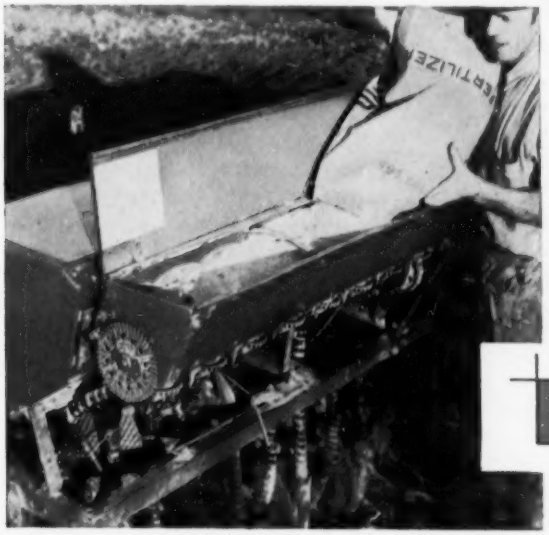


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CALIFORNIA

American Potash & Chemical Corporation is doubling production capacity of granular potash at its Trona, Calif., plant, according to a joint announcement by **E. M. Kolb,** AP&CC eastern general sales manager of heavy chemicals, and **Frank McGrane,** AP&CC sales manager of agricultural chemicals.

The project—which will cost approximately $750,000—is part of the company's current $3,500,000 improvement program at the Trona plant. Installation of the new potash granulating units is being done in two parts, with the first half now nearing completion and the final half scheduled to be completed by the end of 1957.

"Additional production facilities for granular potash were required by the fast rise in consumption in recent years," the announcement said. "We believe the new granulating units will permit us to fill all of our national requirements for the 1958 planting season."

Mr. McGrane pointed out that potash consumption throughout the United States has increased approximately five per cent per year for the past five years.

IDAHO

Central Farmers Fertilizer last month broke ground at Georgetown for their $7,500,000 phosphate concentrating plant, part of a more than $14,000,000 venture by a group of 16 mid-West cooperatives, representing 1,500,000 farmers. The Governor and pioneers who had a part in developing the phosphate industry participated in the ceremonies. Phosphates mined from Georgetown canyon will be processed into high analaysis fertilizer when the whole program is completed.

* * *

Stauffer Chemical's exploration work conducted by San Francisco Chemical Co. at Stauffer's Hot Springs, Idaho, phosphate rock property has indicated a multi-million ton ore body. Extensive underground development work, which the company has carried through during the past three years, has established that the Stauffer reserves include at least a million tons of easily minable, high grade phosphate rock which can be used for the economic manufacture of superphosphates. In addition, many times that tonnage of highgrade rock is indicated, and a vast quantity of lower grade phosphate shales have been proved out. The latter could be used as raw material for the electric furnace production of elemental phosphorous or might be beneficiated.

The company does not plan immediate exploitation of this ore because it already has substantial reserves of phosphate rock in other properties it owns, or has interests in through affiliated companies, in Wyoming, Idaho and Utah. However, the just charted ore body provides substantial additional reserves for future use.

Stauffer has major superphosphate operations at Tacoma, Washington, Richmond and Vernon, California. The company is also a part owner, with Kennecott Copper and American Smelting and Refining Company, of Western Phosphates, manufacturers of high analysis phosphate fertilizers at Garfield, Utah.

LOUISIANA

Skyways Inc. has been incorporated at Kaplan with capital stock of $15,000 to do aerial crop dusting and fertilizing.

MARYLAND

Wm. B. Tilghman Co. in the very useful houseorgan, The Tiller, have a feature currently on "Our Fading Fertility" which warns against under-nourishment of plants, and gives the danger signals in dramatic photos and text.

MINNESOTA

St. Paul Ammonia, Pine Bend, is warming up its $16,000,000 plant and are about ready for distribution of solutions. This is another of the **Central Farmers Fertilizer** operations (see Idaho, above) and will supply high grade anhydrous ammonia and nitrogen solutions to all 16 of the regional coops that belong to the Central organization.

MISSISSIPPI

Hayes Sammons Chemical of Mission, Texas, have opened their Dixie Division plant at Indianola. **Andy White** and **Arthur Smith** have moved from Mission to manage the operation. The company produces pesticides and fertilizers.

SOUTH CAROLINA

Beaufort Mining and Development Co. has been formed to revive phosphate mining in Beaufort County, which died in 1904 following excessive state royalties, a devastating storm in 1893 and the opening of the Florida mines. The concern has a 10 year lease on the tidelands in the county.

SOUTH DAKOTA

Summers Fertilizer and **Consumer Co-op Assn.** supplied the fertilizer for corn acreage included in the state and national corn-picking contest.

UTAH

San Francisco Chemical, affiliate of **Stauffer,** needs only to solve the problem of adequate power at economical rates to complete plans to use the some 700,000,000 tons of phosphatic materials in Uintah County. If the output of the Flaming George Dam can serve, with its potential of 80,000 kilowatts, Stauffer is said to be prepared to build the first unit of an elemental phosphorus plant. Stauffer has issued no word on this—the above being from local sources.

AUSTRALIA

The Sulphide Corporation proposes to establish zinc smelters and to develop its production of sulphuric acid at Cockle Creek, New South Wales. The project will call for 500 added workers, and consume 75,000 tons of coke annually.

BELGIUM

Carbochimique, of Tentre, Hainaut, which has doubled its ammonia production capacity since 1947 and now can turn out 240 daily tons, is planning to further increase production to 300 daily tons.

CANADA

Shell Oil has been joined by **Texas Gulf Sulphur** and **Devon-Palmer** in the project reported here last month to build and operate a sulphur extraction plant in the Okotoks dis-

trict, Alberta. They expect to have the plant in operation by fall of next year turning out 300 daily tons of elemental sulphur. The field was discovered by Shell. Texas Gulf will operate the plant. Devon-Palmer will operate the gas field.

* * *

Potash Company of America has begun construction of the $20,000,000 Saskatoon mining operation, with **Stearns-Roger Engineering** of Calgary as chief contractor. By early next year they expect to have completed a potash concentrator and a surface plant.

* * *

Dow Chemical has bought 400 additional acres of land in "Canada's Chemical Valley" Sarnia, Ontario. No plans as to what will be constructed have been announced, but it must be remembered that Dow, since 1947, has added a dozen plant units and as many new products in their Canadian operation.

INDIA

The Government is setting up a second DDT factory in Kerala which is expected to be in production by the middle of next year. The machinery has already begun to arrive at the Cochin port.

ISRAEL

Dead Sea Works Ltd., has ordered new handling machinery from West Germany for its plant at Sodom, which is expected to raise the present level of 5000 monthly tons to 11,000.

ITALY

Montecatini has begun construction of its new potash fertilizer plant at Agrigento, Sicily. It will have an initial capacity of 50,000 annual tons of 48/50% potassium sulphate fertilizer. It will be only 18 kilometers from the Bosco-Serradifalco deposits recently discovered by Montecatini.

Alabama Conference At API July 30-31

The annual Alabama Fertilizer Conference will be held July 30-31 at three locations of the API Agricultural Experiment Station system.

The first day's program will be held at the Main Station in Auburn; the second day's session will open at the Foundation Seed Stock Farm, Thorsby, and close with a tour of the Chilton Area Horticulture Substation, Clanton.

New Bulletin Describes Richardson's Bagging Scales

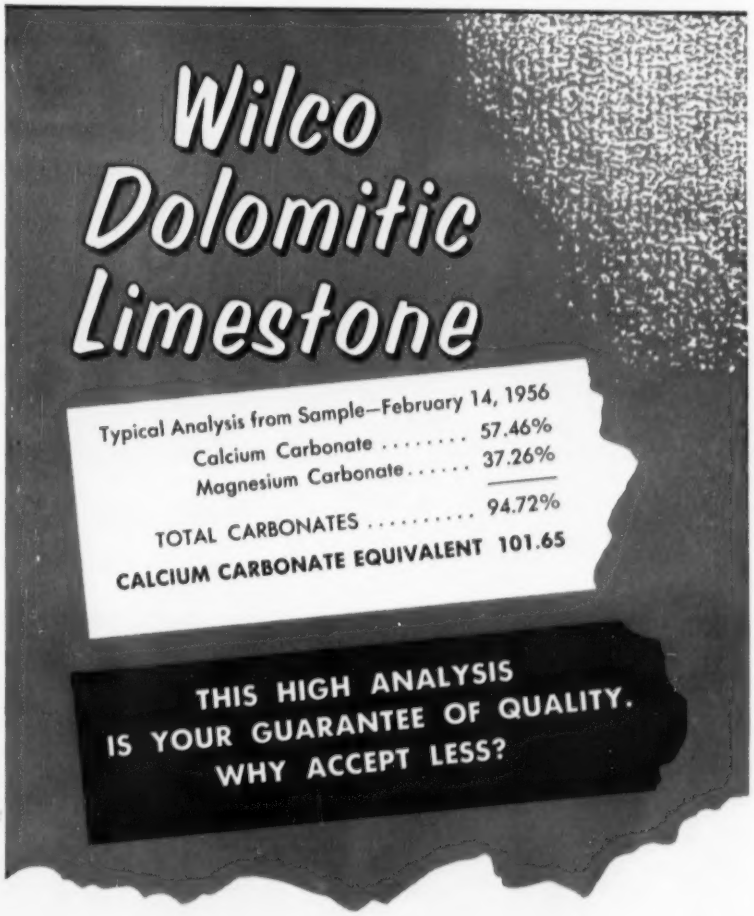
A full description of automatic bagging scales (model FFFP) for measuring grains, seeds, small pellets and other materials is presented in a new two-color, six-page bulletin by Richardson Scale Co.

The bulletin gives details regarding the characteristics of construction, operation, capacity, speed, accuracy, economy and versatility claimed for the scales. Also described are a number of special features.

The scales are pictured in 12 illustrations, including two engineering drawings. They are available in three styles—floor portable, overhead portable and overhead stationary.

The bulletin gives shipping weights and measurements for domestic and export purposes and indicates how various pieces of accessory equipment can be used with the scales.

For copies of Bulletin No. 0357 on the model FFFP automatic bagging scales, write to Hart Bandstra, Richardson Scale Co., Van Houten Ave., Clifton, N. J.



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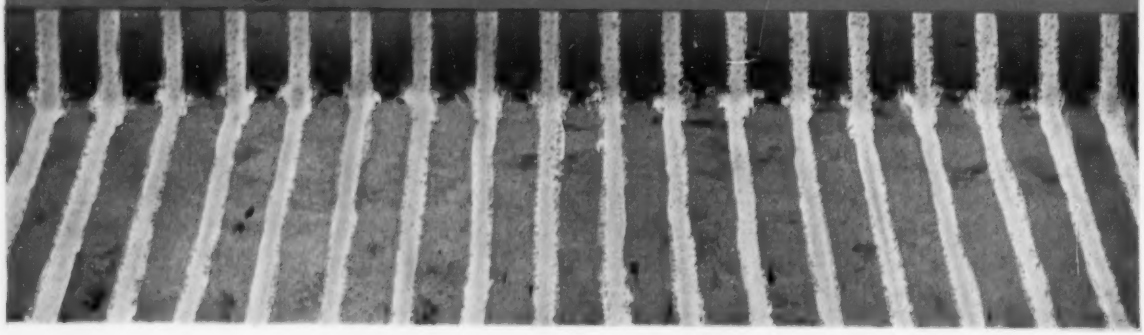


DUVAL

HIGH GRADE MURIATE OF POTASH

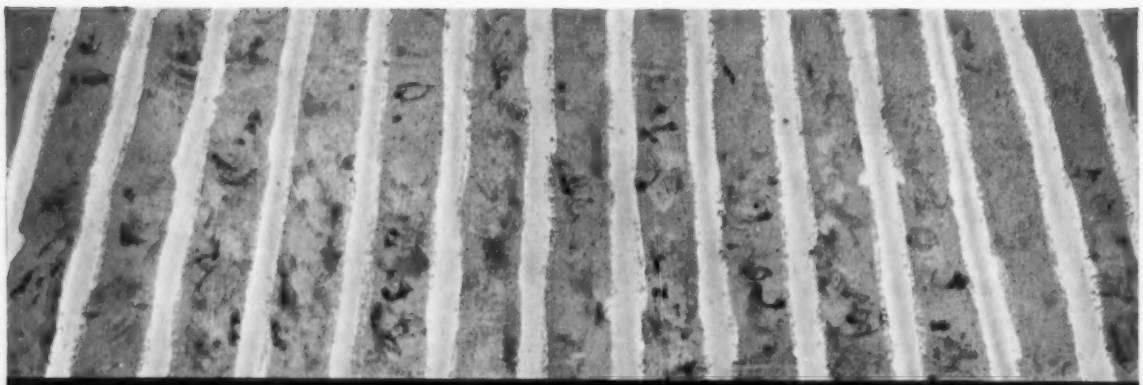
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Personals

Robert P. Arnold, previously Northern district sales manager, for Terra-Lite products, has been named Terra-Lite sales manager for Zonolite Company, miners and manufacturers of vermiculite. He succeeds Harry A. Dresser, who leaves Zonolite to accept a position with American Cyanamid Company of New York City.



Emulsol Chemical Corporation, a division of Witco Chemical Company, announces the appointment of Sy Friedman to their sales staff as assistant to A. O. Raven, sales manager. Mr. Friedman will make his headquarters at Emulsol's general sales office at 75 E. Wacker Drive, Chicago 1, Ill.



Davidson-Kennedy Associates Company, designers and constructors of chemical plants, have announced the appointment of H. M. Betzig as vice president-engineering. In his new assignment with Davidson-Kennedy Associates Company he will direct the engineering and project management activities as well as personnel recruitment.



Louis H. Wilson, NPFI director of information and secretary is one of ten in the nation to be honored at the June conference in Washington of the 4-H clubs as "Friends of 4-H."

* * *

Julian A. Rogers has been elected vice-president in charge of production for the **Best Fertilizers** plant at Lathrop, Cal., which produces 300 daily tons of pelletized fertilizers, from their own phosphoric and sulphuric acids. He was formerly with **W. R. Grace and Co.** and other leading producers.

* * *

Robert M. Magness has been named assistant to the manager of heavy chemicals sales for **U. S. Industrial Chemicals Co.,** division of **National Distillers and Chemical,** it has been announced by **Lawrence C. Byck, Jr.,** manager of heavy chemical sales.

Mr. Magness will assist Mr. Byck in sales of U.S.I. fertilizer raw materials, including ammonia, nitrogen solutions, sulfuric acid, and phosphatic fertilizer solution (wet process phosphoric acid).

Mr. Magness, who was graduated from the University of Maryland in 1950 with a Chemical Engineering degree, brings to U.S.I. a strong background in fertilizer chemistry. He has been employed for the past three years as a sales engineer on sulfuric acid and phosphate plants for Chemical Construction Corporation, and, previous to that he had been doing fertilizer development and research work with the U. S. Department of Agriculture in Beltsville, Maryland.

* * *

John B. Clopton has joined **Escambia Chemical Corporation,** it was announced by A. N. Wohlwend, vice president and director of commercial development.

Mr. Clopton is located at the company headquarters at 261 Madison Avenue, New York City, and will devote his activities to commercial development and the sales of ammonia products and methanol.

He was formerly with the plastics division of **Monsanto Chemical Company** at Texas City, Texas, where he was sales manager for monomers and raw materials.

* * *

Stauffer Chemical Company has appointed **Robert P. Obrecht** as director of the Richmond, California, research laboratory. He will be in charge of all research and development activities at that location.

* * *

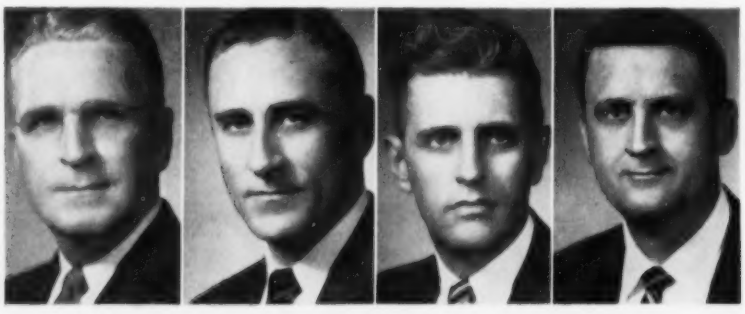
Thomas M. Ware, administrative vice-president of **International Minerals and Chemical Corporation,** Chicago, has been elected a director of the company. He fills the vacancy created by the retirement of **David M. Milton,** who served on the board for the past 15 years.

The board also elected **Dr. Milton LeBaron,** vice-president in charge of research; **William Bellano,** vice-president in charge of engineering and **Anthony E. Cascino,** vice-president in charge of marketing.

* * *

V. H. Hair, general credit manager of **Armour Fertilizer Works,** Atlanta,, Georgia, and assistant treasurer

L. to R.: John L. French, C. H. Godfrey, R. Andrew Jenkins and Raymond T. Waller, who have been named regional sales managers of Virginia-Carolina Chemical Corporation's fertilizer division, it has been announced by A. P. Gates, general sales manager. Gates said that the new posts have been created in a reorganization of the company's fertilizer sales organization along regional lines. Under the new set-up, V-C sales office managers, to be called district managers, will be under the direction of the four regional managers. These, in turn, will operate under Field Sales Manager Charles E. ("Jack") Workman, and General Sales Manager Gates.



of **Armour and Company,** retired June 15 after almost 45 years' service with Armour. **James H. Charles,** formerly assistant general credit manager, has been announced as Mr. Hair's successor. Mr. Charles has been with Armour since April 30, 1914.

* * *

Robert W. Crabtree, manager of nitrogen product sales for **Hercules Powder Company's** explosives department, has been named manager of chemical sales, a newly created post in that department. He will be responsible not only for sales of nitrogen products but for sales of methanol and diversified chemicals. Mr. Crabtree joined Hercules in 1934.

* * *

E. A. Cronheim, a veteran of fifty-five years of continuous service with **Fulton Bag & Cotton Mills,** has announced his retirement. In point of service he is one of the oldest employees of this company, which was founded in 1868.

Shortly after the turn of the century, Mr. Cronheim entered Fulton's service as an office boy. He still has his first pay envelope which he prizes as a souvenir.

* * *

J. Peter Grace, president of **W. R. Grace & Co.,** has announced that **William J. Haude** has been appointed president of Grace Chemical Company Division.

Since May 1955, Mr. Haude has been vice president and general manager of Grace Chemical Company located in Memphis, Tennessee.

* * *

Hugh J. Murphy, associate agronomist of the **Maine Agricultural Experiment Station,** will replace **Charles E. Cunningham** as the leader of the agronomy potato research program in Aroostook County, according to an announcement made by **Dr. Arthur A. Hauck,** president of the University of Maine.

* * *

Samuel L. Nevins, vice president of **Olin Mathieson Chemical,** was elected a member of the National Committee on Boys and Girls Club Work at the annual meeting held recently in Chicago.

W. F. Otterstrom has been promoted to comptroller of **Olin Mathieson. Thomas S. Nichols,** chairman, and **Stanley de J. Osborne,** president, announced. He replaces **R. B. Lewis** who resigned, but will continue as consultant to the corporation until August 15.



DR. LOWELL NELSON

The appointment of Dr. Lowell G. Nelson as a California Spray-Chemical Corporation district agronomist has been announced by Leo R. Gardner, Calspray's manager of research and development. Dr. Nelson, who joined the research staff at Calspray's Portland office on June 1, is filling one of the new positions created by the continued expansion of Calspray's fertilizer program in the Pacific Northwest territory.

The **American Agricultural Chemical Company** announces the following administrative and production changes: **R. B. Richey** was elected vice president, relinquishing his former direct production responsibility, in order that he may devote his efforts to broader areas of administrative work.

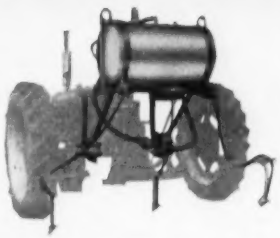
W. J. Turbeville, Jr., was elected vice president-fertilizer sales, with

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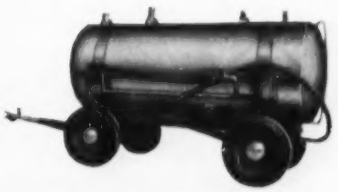
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General Metals, Inc., manufactures a complete line of custom and standard equipment needed for use of nitrogen solutions, including field applicator and transport units, pressure and non-pressure tanks in wide range of sizes and types, aluminum stainless parts, fittings, all accessories, and engineering services. Manufacturers', dealers' and users' inquiries are invited.

THE FAMOUS "SPEEDY-SPREAD"—A COMPLETE TRACTOR-MOUNTED FIELD APPLICATOR

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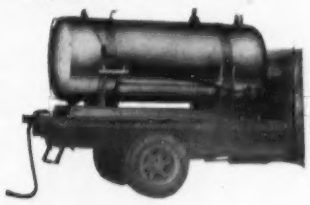
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Includes: 7-ton cap., 4-wheel wagon with 8-ply tires, electric brakes, 1,000 gal. aluminum tank built according to A. S. M. E. code for 30 lbs. pressure, gasoline-powered air compressor, hoses, gauges, all fittings, valves, and other components.



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Includes: 2-wheel trailer, aluminum tank with No. Car.-approved measuring gauge for custom operators, 21-ft. boom with complete set of nozzles, P. T. O. pump, sub-surface attachments, all fittings, valves, and other components. (Also custom-built to your specifications.)



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Lawrence J. Munzenmaier, a specialist in turfgrass management, who has been assigned to the Pacific Northwest (including Northern California) as a sales representative for Du Pont's nitrogen products. His headquarters will be in Sacramento, California.

full responsibility for all phases of fertilizer sales operations.

D. S. Parham was elected vice president-production, with full responsibility for all phases of production, including phosphate rock mines.

John A. Layton, formerly superintendent Baltimore Works, is transferred to the production department, New York office.

Harry M. Rau, formerly assistant superintendent, Carteret Works, becomes responsible for production as superintendent at Baltimore Works.

* * *

Charles A. Thomas, president of Monsanto Chemical Company received the honorary degree of Doctor of Engineering from the Polytechnic Institute of Brooklyn on June 12.

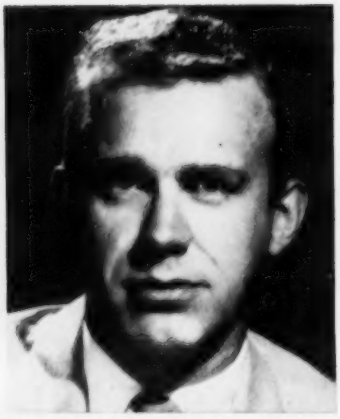
George Gorbell, Monsanto manager of safety and fire prevention, was elected executive vice president of the Safety Council of Greater St. Louis recently.

* * *

R. F. "Bud" Hobbs, formerly with the sales promotion department of **St. Regis Paper Co.,** has joined the sales staff of **Kraft Bag Corporation.** He will handle sales in Northern Ohio and Michigan.

R. A. Kurlander, previously with **Westinghouse Mfg. Co.,** and recently sales representative for Kraft Bag operating out of Montgomery, Ala., has been transferred to the Kraft main office. He will cover New York State and the New England area.

Robert T. Smith, formerly with **Parkersburg Rig and Reel Co.** and Harbison-Walker Refractories Co., has joined **Kraft** as sales engineer for Alabama and Western Tennessee.



Robert D. Johnson, of The Marietta Concrete Corporation, Marietta, Ohio, who has been appointed a vice president of the company according to F. Leonard Christy, president. In his new position, Mr Johnson will be in charge of all engineered product sales.

He will operate out of Birmingham, Ala., replacing Mr. Kurlander. Both men will report to **Edward Burgers, Jr.,** eastern sales manager of Kraft Bag Corporation, 630 Fifth Avenue, New York.

* * *

Dr. Donald S. Taylor has been elected vice president in charge of research for **United States Borax & Chemical** to succeed **G. A. Connell,** now retired, it was announced by **James M. Gerstley,** president.

Dr. Taylor, who will take over his new duties immediately, will make his headquarters in the Corporation's new $1,000,000 Research Center which is now nearing completion in Anaheim.

Richard F. Steel has been appointed assistant general manager of **United States Borax & Chemical,** a newly-created post in the organization. The appointment makes him an officer of the corporation, whose headquarters are in Los Angeles.

Pacific Coast Borax Company division of **United States Borax & Chemical** has announced the appointment of **Jay B. Ford, Jr.** as assistant general manager of this division. Mr. Ford was formerly with the **United States Potash Company** division, where he had been assistant treasurer and subsequently assistant general manager.

* * *

Modesto L. Leonardi has been named as manager of plant production at **American Potash & Chemical Corporation's** main plant at Trona, Calif., according to an announcement by **Calvin L. Dickinson,** director of manufacturing.

Mr. Leonardi has been with American Potash & Chemical Corporation since 1939.

A. J. Anderson, formerly manager of plant production, has been appointed advisory engineer for the Trona facility. His initial project will be a series of studies on the Trona operation to aid in long-range production planning.

* * *

W. A. Ackerman has been elected secretary of the **United States Borax & Chemical Corporation,** it was announced in New York by **James M. Gerstley,** president.

Formerly assistant secretary of the corporation whose headquarters are in Los Angeles, Mr. Ackerman replaces **R. F. Steel** who was promoted recently to the newly-created post of assistant general manager.

Sturtevant Mill Company Offers Blender Literature

Sturtevant Mill Company has published a new Rotary Batch Blender brochure, which describes in detail how the Sturtevant four-way blending action produces highly intimate blends in as little as one to two minutes.

The brochure gives specification information on all nine models of Blenders and shows how the rotary drum design saves plant space, including headroom.

A sectional view of the Blender points out how the special stuffing box and packing seal accomplish dustless operation. All bearings are on the outside of the drum, as shown in the brochure illustrations, and no product contamination is possible.

To obtain a copy, request Brochure BL-157 from Sturtevant Mill Company, Park and Clayton Streets, Boston 22, Mass.

FIRE ANTS SAY UNCLE

SCAN, Shell Chemical's breezy newsletter, cheers for dieldrin as a solution when ants make you say uncle. And from down Arkansas way comes word that the El Dorado Fertilizer Co. has been awarded a contract to furnish 240,000 pounds of Heptachlor to attack the Fire Ant, whose inroads have folks worried all the way up to Maine and Vermont!

On the other hand, the Mississippi AES publication for May expresses distress because fire ants come out of their hills, and scorn the most tasty poisons they set before them. But they are hopeful, and are now testing area treatments with Chlordane, Dieldrin, Heptachlor and Aldrin.

Southern Control Officials' Meeting Draws 75 to Birmingham

The Association of Southern Feed and Fertilizer Control Officials held its 15th annual convention at the Dinkler-Tutwiler Hotel, Birmingham, Ala., June 17-19. There were 39 members of the Association present with 36 persons from industry in attendance. In addition to a very interesting program, the Association held informal discussions on subjects pertaining to the control of feeds, fertilizers and pesticides. Action on the part of the Association included giving official status to the standards formerly listed as tentative.

New officers of the Association for the coming year are: Dr. E. W. Constable, State Chemist of the Department of Agriculture at Raleigh, N. C., president; Bruce Cloaninger, Director, Department of Feed and Fertilizer Inspection and Analysis, Clemson, S. C., vice-president; and Bruce Poundstone, Head of Department of Feed and Fertilizer, Lexington, Ky., secretary-treasurer.

In addition to the above officers, the outgoing president, R. W. Ludwick of State College, N. M.; Maurice Rowe, Richmond, Va.; L. C. Jacobs, Nashville, Tenn.; Frank Fudge, College Station, Texas; and F. S. Carr of Atlanta, Ga., comprise the Executive Committee.

Next year's meeting is scheduled for June, 1958, in Atlanta, Ga.

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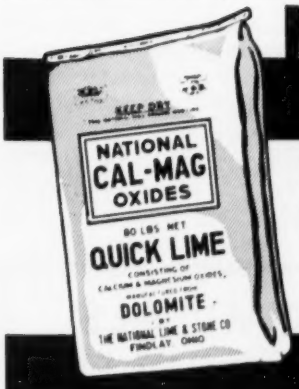
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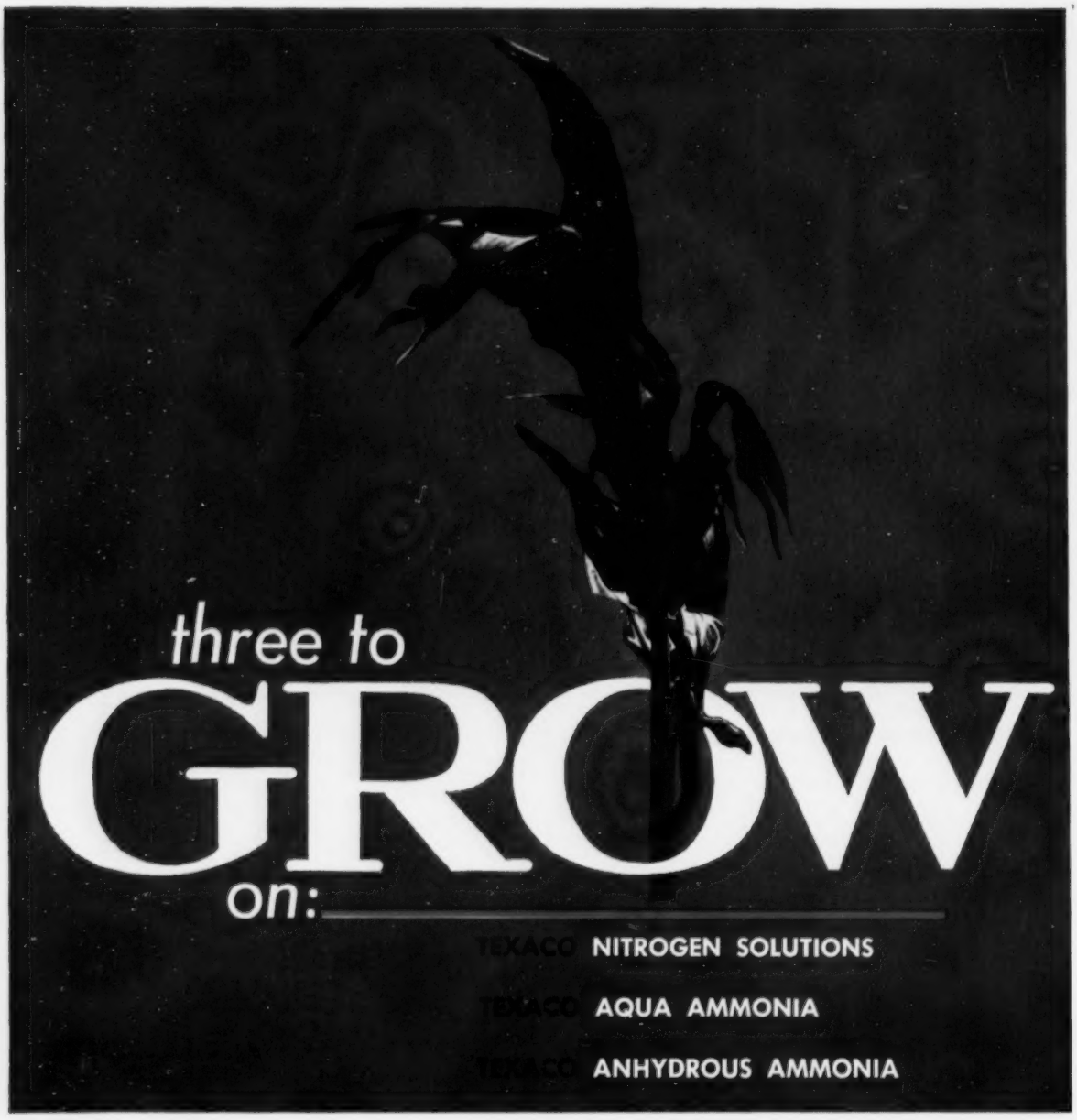
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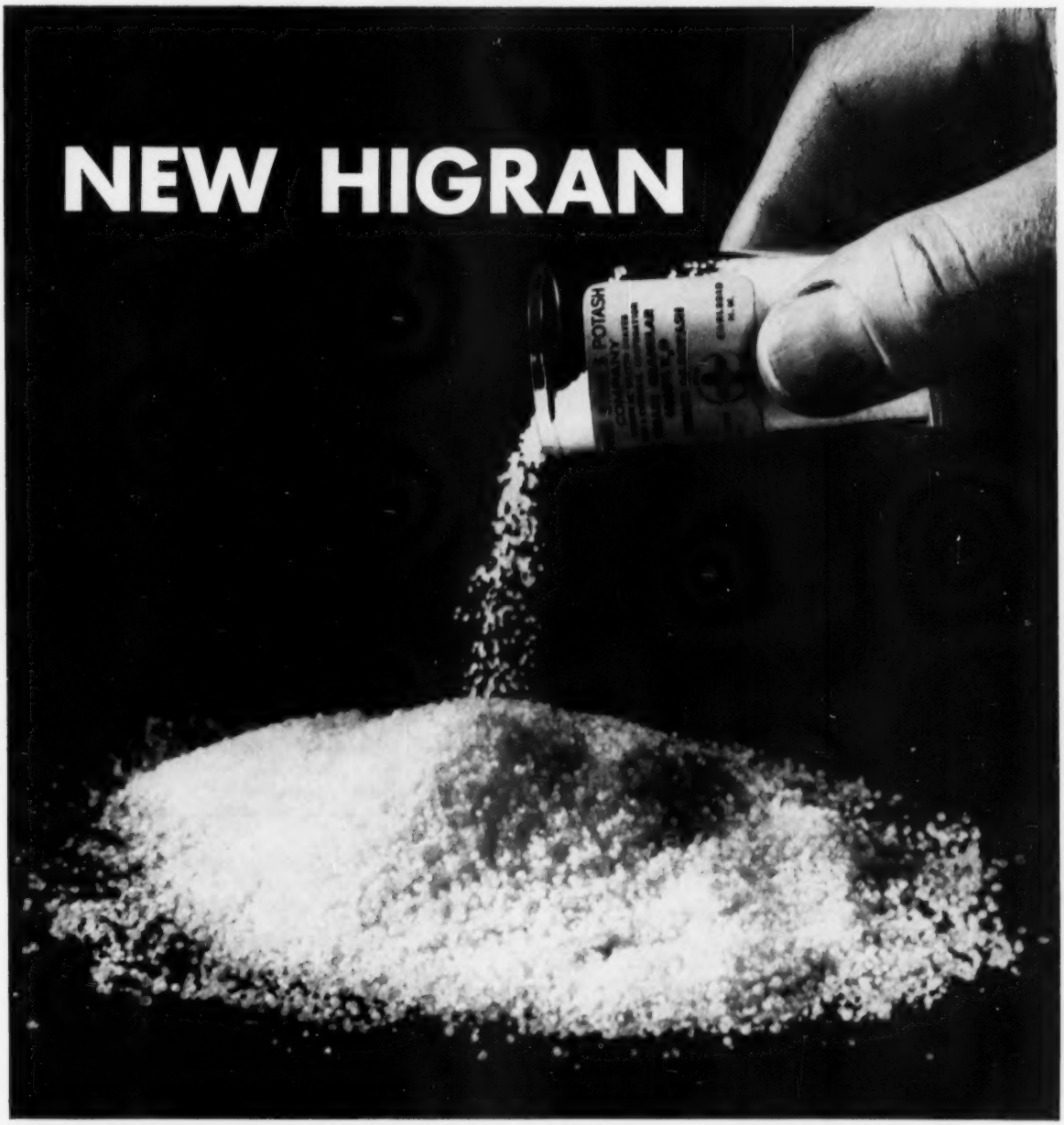
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Pictures from Recent California Meeting

1. Lloyd Dowler, Dean of Agriculture, Fresno State College.
2. Speakers table at the banquet: CFA President Jack Baker; Dr. Firman E. Bear, Rutgers University, New Jersey; Conference Chairman J. H. Nelson; Soil Improvement Committee Chairman M. E. McCollam.
3. Panel on Potash: Forrest Fullmer, American Potash Institute; Dr. Tom W. Embleton, University of California, Riverside; Herman Timm, U. C., Davis; Dr. W. E. Martin, U. C., Berkeley; Dr. Oscar E. Lorenz, U. C., Riverside; and Panel Moderator, Dr. J. E. Knott, U. C., Davis.
4. Speakers Table, Joint Meeting University of California Fertilizer Committee and CFA Soil Improvement Committee: Dr. E. Louis Proebsting, Chairman, University Committee; M. E. McCollam, Chairman, Soil Improvement Committee; Jack Baker, President, CFA.
5. Panel on Micro-nutrients: Dr. Walter Reuther, University of California, Riverside; Dr. Arthur Wallace, University of California, Los Angeles; Dr. John Lingle, University of California, Davis; Dr. Kiyoto Uriu, University of California, Davis; and Panel Moderator, Dr. D. G. Aldrich, Jr., University of California, Davis and Berkeley.

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RESEARCH RESULTS

(Continued from page 14)

Golf courses can be gotten into shape earlier in the spring by way of a "mechanical blotter" called the Aeri-Dryer, a self-propelled gadget that rolls a 24-inch cellulose sponge roller across the grass. This is a specially fabricated duPont sponge which holds up to 20 times its weight in water.

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